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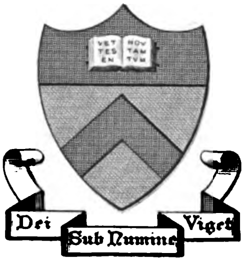

Princeton University.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME XVII

ERSITY
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ON. N. J.

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1916

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the Key to Pronunciation in Vol. I.

ā as in ale, fate.
ā̇ “ “ senate, chaotic.
â “ “ glare, care, and as *e* in there.
ă “ “ am, at.
ä “ “ arm, father.
ȧ “ “ ant, and final *a* in America, armada, etc.
a “ “ final, regal, pleasant.
a̤ “ “ all, fall.
ē “ “ eve.
ē̇ “ “ elate, evade.
ĕ “ “ end, pet.
ẽ “ “ fern, her, and as *i* in sir, etc.
e “ “ agency, judgment.
ī “ “ ice, quiet.
ī̇ “ “ quiescent.
ĭ “ “ ill, fit.
ō “ “ old, sober.
ō̇ “ “ obey, sobriety.
ô “ “ orb, nor.
ŏ “ “ odd, forest, not.
o “ “ atom, carol.
oi “ “ oil, boil.
ōō “ “ food, fool, and as *u* in rude, rule.
ou “ “ house, mouse.
ū “ “ use, mule.
ū̇ “ “ unite.
ŭ “ “ cut, but.
ụ “ “ full, put, or as *oo* in foot, book.
û “ “ urn, burn.
y “ “ yet, yield.
ƀ “ “ Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D “ “ Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g “ “ go, get.
G “ “ German Landtag = *ch* in Ger. ach, etc.
H “ *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw “ *wh* in which.
K “ *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲ “ in sinker, longer.
ng “ “ sing, long.
N “ “ French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh “ “ shine, shut.
th “ “ thrust, thin.
TH “ “ then, this.
zh “ *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz"m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on Pronunciation.

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PANIC.
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---

* Deceased.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

NEWFOUNDLAND, nū′fŭnd-lănd′. A British colony in North America, comprising the island of Newfoundland and its dependency, Labrador. The island lies across the entrance to the Gulf of St. Lawrence between lat. 46° 35′ and 51° 40′ N. and between long. 52° 35′ and 59° 25′ W. (Map: Canada, T 7). It is separated from the east extremity of Labrador in the north by the Strait of Belle Isle, 10 miles wide, while Cabot Strait separates it from Cape Breton Island, 65 miles to the southwest. Newfoundland is that part of North America which lies nearest to Europe, its distance from Valentia in Ireland being 1640 miles. It is roughly triangular in shape, measuring 317 miles from Cape Ray, its southwestern, to Cape Norman, its northernmost point, while the distance from Cape Anguille in the extreme west to Cape Spear in the east is 316 miles. The total area of the island is 42,734 square miles. The coast line is extremely irregular and rugged, being indented with numerous large bays studded with countless islands, and ramifying into narrow fiords which run far into the interior. In the southeast the Bay of Placentia and Trinity Bay run in from opposite sides of the island, cutting off the Avalon Peninsula, which is connected with the mainland by a very narrow isthmus. In the northwest there is a corresponding peninsula, though less detached, known as Le Petit Nord, at the head of which the coast is deeply indented by White Bay. Many of the bays form commodious and well-sheltered harbors with deep water close to shore.

Topography. The coasts form a line of rocky cliffs from 200 to 400 feet high, broken by the fissures which form the entrances to the fiords. In the Bay of Islands on the west coast, the small rocky islets are 1000 feet high, while the shores of the bay rise in Blomidon Cliff to a sheer height of 2125 feet from the water's edge. The interior is an undulating plateau of moderate elevation traversed by a number of ridges which terminate in the headlands, and which, like all the chief physical features, river valleys and headlands, are determined by the strike of the geological formations and run diagonally across the island from southwest to northeast. The principal ridge is the Long Range, which runs along the entire western coast and has numerous peaks from 1500 to 2000 feet high. Avalon Peninsula is rugged and hilly, and scattered over the interior plateau are a number of isolated peaks known as tolts.

Hydrography. Newfoundland has an abundance of lakes, ponds, and streams. The principal rivers flow towards the northeast coast, except the Humber, which breaks through the Long Range and enters the Bay of Islands. The largest stream is the Exploits River, which flows through a chain of long lakes stretching almost across the island, its length being 200 miles. The rivers, however, cannot be used as means of communication except as canoe routes for hunters. The largest lake is Grand Pond, 56 miles long, with an area of 192 square miles, and there are several others almost equaling this in size.

Climate. The winters are not so cold nor are the summers so warm as in Canada, the continental extremes being somewhat modified by the proximity of the water, the annual extremes of temperature being 7° and 83°. The Arctic current, which skirts the east coast, and the east winds, which drive the floating ice into the bays along that coast, prolong the winter and spring and render the climate here raw and chilly in winter and cool in summer. The moist east winds bring frequent fogs.

Geology and Minerals. The bulk of the island consists of Archæan rocks, among which the Huronian system predominates in the southeastern third and the Laurentian in the remainder of the island. There are, however, beds of Paleozoic and Lower Mesozoic, reaching as far as the Lower Carboniferous system. The rocks are arranged in long folds parallel to the northwest coast, the harder rocks forming the ridges, while the softer and later rocks occupy the depressions. The chief mineral is copper, while some lead and silver and a little gold have been found. There are large beds of gypsum on the west coast, and a small coal field exists near St. George's Bay.

Soil and Flora. Large portions of the interior consist of marshes, and there are barren areas of rock covered with lichens and low shrubs of pine and larch. Some parts, however, are heavily timbered, especially about the Exploits, the Gander, and the Humber. The river valleys afford large tracts of good arable land. The principal trees are white and yellow pine, white, black, and red spruce, fir, tamarack, birch, and red maple. Among the wild animals are the black bear, wolf, and several species of fox.

Agriculture, Lumbering, and Mining. Although there are probably 5,000,000 acres of land on the island suitable for agriculture, only 64,494 acres had been improved in 1891. Since that time the government has offered a bonus for cleared land, and the area under cultivation increased. According to the census of 1911 the occupied land is 231,359 acres. The principal crops are potatoes and turnips; hay and oats are also grown. The total value of the crops in 1912 was about $2,000,000. In 1911 there were 13,288 horses, 40,427 cattle, 100,447 sheep, and 27,575 swine. The lumber industry has of late attained considerable importance. The pulpwood forests of the interior are practically inexhaustible, and official estimates look to an annual output of paper valued at $10,000,000 as assured. Extensive pulp mills were in 1914 making 100 tons of paper and 240 tons of pulp daily. The pulp is largely exported to England. The most important minerals exploited are iron and copper, the output of which has increased considerably. The mineral production of the island in 1912 was valued at over $2,810,000. Of this the copper ore and pyrites were valued at $210,000.

Fisheries. Fishing far exceeds all other occupations, and the only manufactures worthy of mention are subsidiary to the fisheries, such as the manufacture of cordage, biscuits, etc. The fisheries on the Grand Bank (q.v.) have declined, and are no longer important for Newfoundland, whose inhabitants are engaged chiefly along the coast and off the coast of Labrador. In 1913 there were 1830 men and 104 vessels employed in the Grand Bank fishery, and the catch of codfish numbered 152,374 quintals, valued at $920,000. In 1912 there were 15,795 sailing vessels, boats, and dories, with 47,385 men, employed in the cod shore fisheries, and in the Newfoundland-Labrador fisheries of that year 827 vessels and 5468 men were employed. In 1912, 289 whales were captured. In 1812–13, 1,408,582 quintals of dry codfish were exported, valued at $7,987,389. Along the west coast of the island, known as the French Shore (see *History* below), the French enjoyed exclusive fishing rights until 1904, when they were put on a footing of equality with British subjects. The United States still enjoys exclusive rights on the southwest coast. Next in importance to the cod are the seal, lobster, herring, and salmon fisheries. Seal fishing is conducted from steamers which enter the solid drift ice upon which the young seal are suckled by their mothers. The number of seal has declined, and the season for hunting has been restricted by law to one month, from March 16 to April 16. In 1913 the sealing fleet consisted of 19 small steamers and 3609 men, and the catch amounted to 272,065 seals. The value of the total catch on the Grand Bank and around the shores of the island and in Labrador was $10,242,556 in 1912–13. The eight vessels engaged in whale fishing took in 1913 about 220 whales and the factories turned out 274,000 gallons of oil and 420 tons of whalebone.

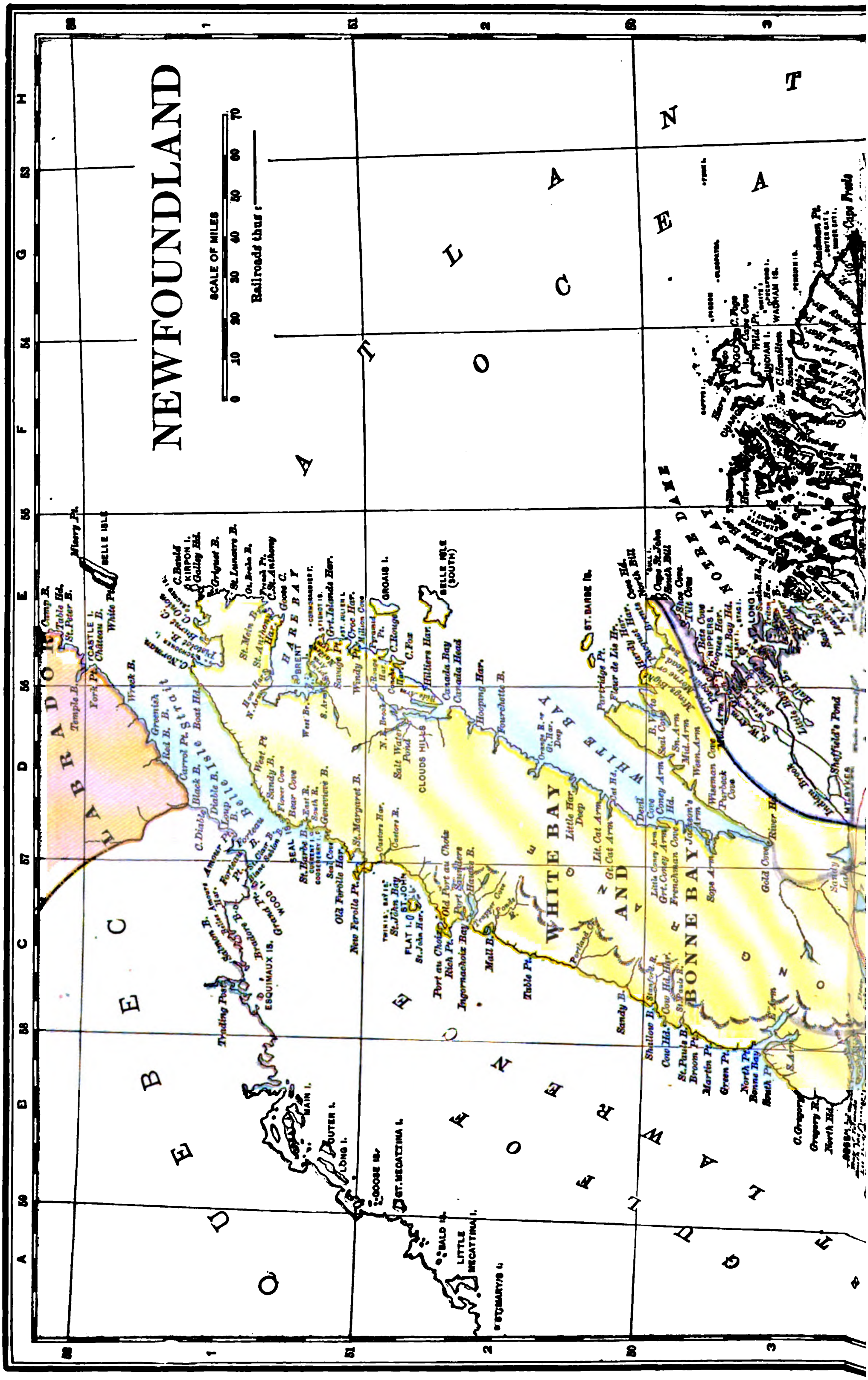
Commerce and Communications. Trade is chiefly with Great Britain, Canada, and the United States. In 1913–14 the total imports were valued at $14,793,000, and the exports at $14,720,000. The chief imports are flour and other food products, textiles, coal, and hardware. The chief exports are dry codfish, iron ores, lobsters, sealskins, seal oil, herring, cod oil, whale oil, and salmon. Communication between the coast settlements is effected partly by water; but railways have been rapidly constructed in recent years. For an account of railway development, see REID, SIR ROBERT GILLESPIE. In 1913 there were 794 miles of government railway and 47 miles of private railways. Various branch lines to coast towns were completed in 1914. In 1913 there were 4897 miles of telegraph and 899 miles of telephone wire.

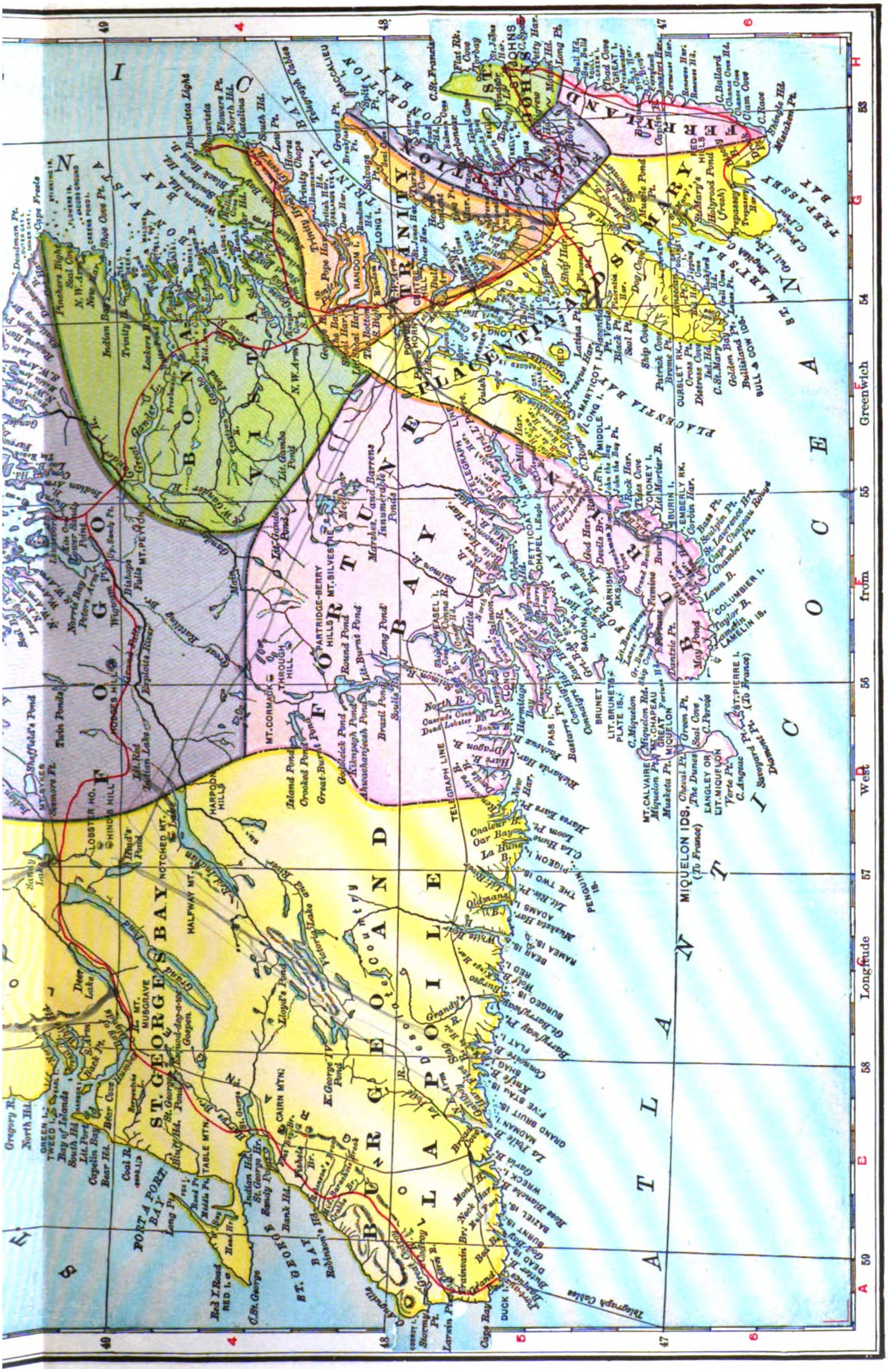
Population. The total population of the colony in 1911 was 242,619, of whom 3998 resided in Labrador. In 1909 the population of Newfoundland was 234,588, and of Labrador, 4026. In 1901 it was 220,984, and of Labrador, 3947. Of the total population in 1911, about 65,000 were engaged in the fisheries. There is practically no immigration, 97 per cent of the population being native born, chiefly of English, Irish, and Scottish descent. The population is almost wholly concentrated on the southeast coast, the interior being practically uninhabited. The capital is St. John's with a population of 32,292 in 1911, and only four other towns, Harbor Grace (4279), Carbonear (3540), Bonavista (3911), and Twillingate (3348), had populations in 1911 exceeding 3000.

Education and Religion. In 1911–12 there were 81,177 Roman Catholics, 78,616 Episcopalians (Church of England), 68,045 Methodists, and 10,138 members of the Salvation Army. The schools are wholly denominational. The school funds are proportioned according to the number of pupils of each denomination, and there are four superintendents of public instruction—one for each denomination, and also inspectors for Presbyterian and Congregational schools. Education is not compulsory, but the public schools are well attended; there are very few private schools. There were, in 1911–12, 356 schools controlled by the Church of England, with 16,523 pupils; 347 Roman Catholic schools, with 17,392 pupils; 344 Methodist schools, with 15,345 pupils; and 63 Salvation Army schools, with 2534 pupils. Higher education is given through four colleges—Church of England, St. Bonaventure's (Roman Catholic), Presbyterian, and Methodist—which prepare students for the examinations of London University.

Government. The executive power is vested in a governor appointed by the crown and a ministry or executive council of nine members, responsible to the majority of the Lower House of the Legislature, the House of Assembly. The latter consists of 36 members, elected by manhood franchise. The Upper House, or Legislative Council, is appointive, its 15 members holding office for life and being nominated by the Governor in Council. The public revenues in 1912–13 were $3,919,040, and the expenditures $3,803,561. The public debt was $29,470,060. The colony, like Canada, has adopted the dollar as the unit of currency.

History. Newfoundland was discovered by John Cabot in 1497, but the English did not take advantage of the discovery for nearly a century. In the meantime the cod fisheries attracted numerous Portuguese, Spanish, and French fishermen. In 1583 Sir Humphrey Gilbert took formal possession of the island for the British crown, but various attempts at settlement were defeated by the French. English


NEWFOUNDLAND
SCALE OF MILES
0 10 20 30 40 50 60 70
Railroads thus :
LABRADOR
QUEBEC
ATLANTIC OCEAN
GULF OF ST. LAWRENCE
NOTRE DAME BAY
WHITE BAY
HARE BAY
BONNE BAY
BELLE ISLE
Strait of Belle Isle
BELLE ISLE (SOUTH)
GROAIS I.
ST. BARBE IS.
CLOUDS HILLS
ESQUIMAUX IS.
ST. MECATINA I.
LITTLE MECATINA I.
C. Bauld
St. Anthony
Cape St. John
Sheffield's Pond


ST. GEORGES BAY
BURGEO AND LA POILE
FORTUNE BAY
FOGO
BONAVISTA
TRINITY
PLACENTIA AND ST. MARY
FERRYLAND
ST. JOHNS
HARBOR GRACE
PORT DE GRAVE
CONCEPTION BAY
BONAVISTA BAY
TRINITY BAY
PLACENTIA BAY
ST. MARYS BAY
TREPASSEY BAY
PORT A PORT BAY
MIQUELON IDS. (To France)
ST. PIERRE I. (To France)
ATLANTIC OCEAN
Longitude West from Greenwich
Telegraph Cables
TELEGRAPH LINE
Grand Lake
Red Indian Lake
Exploits River
Gander Lake
C. Race
C. Ray
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fishermen, however, frequented the shores in increasing numbers. By the Treaty of Utrecht in 1713, France conceded the absolute sovereignty of England over the whole territory of the island. She retained, however, the neighboring islets of Miquelon and St. Pierre as stations for her fishing fleets, and reserved the exclusive right to the cod fisheries on the west coast, including the right to build such temporary structures on land as were necessary for curing the fish. Even after the English acquisition, however, the prosperity of the island was delayed for a century by the repressive measures adopted by the home government, influenced by the mercantile and fishing interests, which desired the island simply as a place for drying fish during the season, to be left barren and uninhabited when the fishing season was over. Settlements were practically forbidden, no titles to land were granted until 1813, and until 1820 no house could be built without a license, while the government of the island was practically left in the hands of the fishing captains. In 1832 Newfoundland finally received a representative government giving the control of its affairs to its inhabitants. Responsible government was established in 1855. The question of the French treaty rights on the west coast reached an acute stage. The French interpretation of the treaty, acquiesced in by the British home government, prevented the settlement and exploitation of the west coast by inhabitants of Newfoundland. Two attempts to arrange a convention between the French and the British governments were vetoed by the Newfoundland government, which furthermore passed an act cutting off the local supply of bait from the French fishermen. The French government retaliated by ordering the confiscation of all fishing implements belonging to foreigners found fishing on the west coast, and it later claimed the right to confiscate the Newfoundland lobster factories which had been established there, although the treaty referred only to cod fishing. In 1890 a temporary settlement was arranged by the Modus Vivendi Act, by which the French and Newfoundland establishments then existing on the shore should be left undisturbed, but no more Newfoundland lobster factories could be built until a final settlement could be reached. In 1904 the matter was finally settled by the Lansdowne-Cambon Convention. The French gave up their rights and got in return the Los Islands and territory in Africa. An indemnity commission made awards to the French interests amounting to $511,499. A year later trouble of a similar character arose over American fishing rights as guaranteed under the Treaty of 1818. In 1905 and 1906 Newfoundland passed acts which the United States claimed to be in violation of her treaty rights. A Modus Vivendi Act was passed in 1906 which held the Acts of 1905 and 1906 in abeyance until the matter could be finally adjusted. It was referred to The Hague Tribunal, which gave its award in 1910. The two chief provisions were that (1) Great Britain could make any fisheries regulations she desired without the consent of the United States, providing they did not violate the provisions of the Treaty of 1818; and (2) the 3-mile limit was to be measured from a straight line drawn across the bay between the two points nearest its entrance (provided the line was not more than 10 miles long). After Canadian confederation (1867) several attempts were made to induce Newfoundland to become a province of the Dominion, but negotiations were never successful. During some of the general elections in the island federation with Canada was the leading issue, and although Canadian interest therein has declined, eventual union with Canada is within the scope of practical politics. During the last 30 years Sir Robert Bond, Sir William Whiteway, Sir R. G. Reid, Sir William Winter, A. B. Morine, and Sir E. P. Morris have taken a prominent part in the affairs of the island, and reference should be made to their biographies in this work.

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NEWFOUNDLAND BANKS. See GRAND BANK.

NEWFOUNDLAND (*commonly* nū-found′-land) **DOG.** This, one of the largest, handsomest, and most intelligent of dogs, named from the island whence he was first introduced to European notice, offers, in his present characteristics, something of a puzzle as to his origin. He is not an aboriginal Newfoundlander. The dog of the native Beothuks was that of the adjacent mainland (Labrador), used mostly for hauling sleds, and it had a double coat of the warmest and thickest hair, the hairs protruding through an undercoat of short and fluffy fur, or wool. From early in the sixteenth century French, Spanish, Portuguese, and English fishermen frequented the shores of Newfoundland in ever-increasing numbers. The presence of so relatively great a foreign population, all arriving in short periods, overtaxed the capability of the native dogs to meet the demand, and, exactly as happened later in Alaska, the first settlers took into the island "outside dogs," among which were undoubtedly some of the big dogs of Spain, where the mastiff, the bloodhound, and a ferocious variety of pointer were then common. These crossed miscellaneously with the Indian dogs, but the pointer especially seems to have introduced into the double-coated native his color, size, intelligence, and keen scent, all qualities well marked in the Newfoundland dog as he came into European knowledge at the end of the eighteenth century. So highly was he then esteemed for his wonderful retrieving powers, that he was almost entirely exported, and his breed in the land of his home almost eliminated. Inquiries made in 1890 showed that, except in one or two outlying islands, none remained in Newfoundland. Fortunately, the breed has been maintained in Great Britain and in America, from the original stock.

The Newfoundland is a massive dog, 27 inches high at the shoulder, and often weighing 100 pounds. In color he is almost always black and white, or all black, although when first imported many were brown and white; and he has a dense coat of coarse texture and oily nature, able to resist water, for which this breed has a passion. If the coat be brushed the wrong way it should fall back into its place naturally. His head is broad and massive; his fore legs perfectly straight, his hind legs very strong with great freedom of action; his feet large and well shaped; his ears small, set well back, and lying close to the head. His eye is small and deeply set, but does not show any haw. Consult authorities cited under Dog.

NEW FREEDOM, The. A political catch phrase, coined, or at least given currency, by Woodrow Wilson during his successful candidacy for the presidency. The phrase summarizes an ideal, economic and political, of individual freedom and opportunity, essentially equivalent to the ideal of nineteenth-century liberalism, the novelty consisting solely in the recognition of the fact that freedom and opportunity require at present positive guaranties adapted to the complex conditions of modern industrialism. Laissez faire, though perhaps conducive to individual opportunity in a more primitive industrial state, is regarded by the champions of the New Freedom as an inadequate basis for governmental policy to-day. In the concrete, the New Freedom assumes a friendly attitude towards the regulatory activities of government, such as public control of conditions affecting the health and safety of the workingman, publicity in corporate finance, strict regulation of public-service corporations, the extirpation of monopoly and the repression of "cutthroat" competition, the imposition upon banks and finance companies of the principle of equal treatment of all borrowers offering satisfactory security. While not committed to free trade, the new freedom is inimical to high protective tariff rates. In the political field, the new freedom seeks to "restore the government to the people," through the simplification of the ballot, the introduction of the initiative, referendum, and recall, direct primaries, and other measures calculated to weaken machine control. While in many of its concrete proposals the New Freedom is in harmony with the "progressive" tendency developing in the Republican party prior to 1912, and in that year organized in the Progressive party, the essential viewpoints are easily differentiated. The New Freedom looks to the individual as the prime mover in progress; the business of organized government is merely to free the individual from the untoward influences that have sprung up in an era of monopoly and unjustifiable governmental favoritism. Progressivism, on the other hand, looks upon organized government as a positive force which, under prevailing conditions, ought to supplement the individual forces making for progress. In practice the antithesis appears clearly in the opposing attitudes towards the trusts. The New Freedom would destroy them; Progressivism, at least in its dominant faction, would preserve the trusts, subject to close governmental regulation, as potent instrumentalities of economic progress in domestic industry, and especially in foreign trade.

NEW'GATE. A famous London prison, established at the "new gate" of the city, probably near the beginning of the twelfth century. The earliest authentic mention of it dates from 1218, when it was repaired by order of the King. It was repaired and enlarged in 1638, and wholly rebuilt after the great fire of 1666, which had partially destroyed the old building. In 1770 work was begun on the reconstruction of the prison. The work was hardly finished when the prison was sacked during the Lord George Gordon riots. In 1857–59 the internal structure of Newgate was changed, so as to provide separate cells for prisoners, who had formerly been permitted to mingle with each other. In 1902 the building was demolished.

In the early centuries of its existence Newgate was used for almost every class of prisoners —prisoners of state, Jews charged with child murder, regraters and forestallers, debtors, as well as for ordinary criminals. The prisoners endured a most wretched existence. If they possessed property, they were subjected to the limitless rapacity of their jailers; if without property, they had to rely upon alms for food. Frequently they were detained for years before securing a hearing on the charges upon which they had been committed to prison. These conditions remained practically unchanged in the sixteenth and seventeenth centuries, when the prison began to be crowded with a new class of inmates, those who adhered to proscribed religious creeds. Henry VIII and Mary, and in later years of her reign, Elizabeth, made use of Newgate as a place of detention for those who were to be tried for heresy or popery, as the case might be. It was in Newgate that such prisoners were tortured in the hope of their recantation, or to force them to implicate others. John Rogers and Hooper were among the more famous of the prisoners of this class.

With the cessation of religious persecution, Newgate was again occupied chiefly by felons awaiting execution, by persons awaiting trial on criminal charges, and by debtors. The condition of its inmates was evil both from a moral and a sanitary point of view. Those who were guilty of mere misdemeanors were permitted to associate with the most hardened criminals, with the result that many not originally inclined towards professional crime became involved in the plots of the professional criminals. This evil was aggravated after 1780, when Newgate became the regular place of detention of felons condemned to transportation. After 1815 debtors were no longer confined in Newgate. Sanitary conditions were even worse. From the Middle Ages Newgate had been noted for its epidemic diseases—the jail distemper, probably a form of typhus fever, being a frequent malady. In 1414, 64 prisoners died of this disease, and its ravages were common down to the end of the eighteenth century. In 1752 an attempt was made to check the evil by the employment of mechanical ventilation, but with small success. In the early part of the nineteenth century philanthropists began to interest themselves in the moral and sanitary conditions of Newgate. Effective reform did not take place, however, until after 1840. After 1849 convicted prisoners were removed to a new prison in Holloway, and Newgate remained, until its demolition, almost exclusively a place of detention for prisoners awaiting trial. Consult A. Griffiths, *Chronicles of Newgate* (London, 1884).

NEW GLASGOW, gläs'kō. A manufacturing town of Pictou Co., Nova Scotia, Canada, on the East River and on the Intercolonial Railway, 8 miles southeast of Pictou Landing on

Northumberland Strait, with which it is connected by a branch line (Map: Nova Scotia, G 3). It is the centre of an important coal and iron and steel district, possessing rolling mills, forges, and finishing works. There are also manufactories of all kinds of steel and wooden freight cars, glass, bricks, foundry and machine-shop products, electrical appliances, steel and wire fencing, woodwork, tools, mineral waters, drain pipes, and barrows. Coal and limestone are found in the surrounding district. Pop., 1901, 4447; 1911, 6383.

NEW GRANADA, grȧ-nä̆′dȧ. The old name for the Republic of Colombia (q.v.).

NEW GUINEA, gĭn′ė, or Papua. After Australia and Greenland, the largest island in the world. Forming a great barrier between the Malay islands and the Pacific, it lies between lat. 0° 25′ and 10° 40′ S. and between long. 130° 50′ and 150° 35′ E. (Map: East India Islands, K 7). It is separated from Queensland (Australia) by the shallow Torres Strait. Its greatest length is 1490 miles and greatest breadth 430 miles. Politically the island is divided into three parts: Dutch New Guinea, the western portion; Kaiser-Wilhelmsland, the northeastern part; and British New Guinea, the southeastern part. The total estimated area, exclusive of adjacent large islands politically attached, is 300,274 square miles. Much of the island is unknown, so that the number of inhabitants is conjectural; it may be estimated, in round numbers, at 1,000,000. The areas of the three divisions, with their estimated populations, are shown below.

DIVISIONS	Sq. mi.	Pop.
Dutch New Guinea..............	151,789	200,000
Kaiser-Wilhelmsland..............	70,135	531,000
British New Guinea..............	87,786	252,000
Total....................	309,710	983,000

With large adjacent islands Dutch New Guinea has an estimated area of 152,428 square miles; this territory is a part of the East Indian outpost province of Ternate. Kaiser-Wilhelmsland formed a part of the possessions known as German New Guinea, which included the Bismarck Archipelago and the German Solomon Islands. British New Guinea constitutes the principal part of the territory of Papua; this territory, which includes the Trobriand, Woodlark, Louisiade, and D'Entrecasteaux groups, is politically attached to the Commonwealth of Australia. The eastern boundary of Dutch New Guinea, beginning at a point on the south coast in long. 141° 1′ 48″ E., runs north to the Fly River, with which it coincides until 141° 1′ is reached, and then follows the latter meridian to the north coast. Starting from the Dutch frontier at a point 5° S., the boundary between Kaiser-Wilhelmsland and British New Guinea runs in a generally southeast direction to a point on the coast 8° S.

Much of New Guinea is under forest, and in large part the soil is reported fertile. The country is mountainous, lofty ranges extending northwest and southeast. Some of the peaks are far higher than any in the East Indies or Australasia. Notable ranges are: in British territory, the great Owen Stanley Range, with Mount Victoria (13,200 feet), Mount Scratchley, and Mount Albert Edward; in Kaiser-Wilhelmsland, the Finisterre, Krätke, Bismarck, and Prince Alexander mountains; in Dutch territory, the Snowy and Charles Louis mountains. In the Snowy Mountains (where perpetual snow has been found at 14,635 feet), Mount Wilhelmina has an altitude stated at 15,580 feet. There are estimates of even loftier elevations. The principal rivers include the Amberno, Kaiserin Augusta, Mambare, Purari, and Fly. The annual rainfall, so far as observed, varies from 30 inches to 130 inches; precipitation is greater in the west than in the east. At an elevation of about 3000 feet the temperature is agreeable. There is a large and varied flora. The fauna is conspicuous, like that of Australia, for its small number of mammals, among which marsupials and monotremes predominate, but is notable for the number and beauty of its birds, especially the birds of paradise.

The natives are divided into many isolated tribes, differing in appearance and language; but, as a whole, they constitute the Papuan race, which has been classed as a branch of the Negro race. With the Papuans, however, the nose is usually prominent and the hair frizzly rather than woolly. The color varies from sooty brown to black. In general the Papuans are impulsive, demonstrative, and less ill-natured than popular accounts imply. Some practice fishing, others a primitive agriculture, and many excel in decorative arts. There is practically no native political organization; chieftainship is unknown or at most very uncommon.

New Guinea was probably sighted by the Portuguese Antonio d'Abreu in 1511, but the first European to visit the island was apparently either the Portuguese Dom Jorge de Menesis in 1526 or the Spaniard Alvaro de Saavedra in 1528. In 1793 New Guinea was annexed by the Dutch, and in 1884 German and British protectorates were declared. In 1914 an expeditionary force from Australia occupied Kaiser-Wilhelmsland. See Papua; War in Europe.

NEW HAILEYBURY. See Haileybury College.

NEW HAMP′SHIRE. A North Atlantic State of the United States, belonging to the New England group. It lies between lat. 42° 40′ and 45° 18′ N. and between long. 70° 37′ and 72° 37′ W. It is bounded on the north by the Canadian Province of Quebec, on the east by Maine and the Atlantic Ocean, on the south by Massachusetts, and on the west by Vermont, from which it is separated by the Connecticut River. Its general shape is that of a right triangle with the right angle at the southeast corner and the acuter apex pointing north. Its extreme length is 178 miles, its extreme width 88 miles, and its area 9341 square miles, of which 9030 square miles are land surface. It ranks fortieth in size among the States of the United States.

Topography. Presenting a hilly surface of considerable irregularity, New Hampshire is a region of worn-down mountains. From the seaboard the even-topped upland passes inland into higher and more uneven hills, and finally loses itself in the White Mountains. The Connecticut valley, running south-southwest, follows the trend of a belt of rocks of inferior resistance to erosion. The same north-northeast-south-southwest trend comes out plainly in linear hills and valleys, and minor ridges and swales wherever foliated rocks occur, as they do in most parts of the State. The mountains without exception are of residual origin. A number of them owe their survival to local masses of syenite or granite, more resistant to erosion than the schists and gneisses which surround them. The great majority of them, however, owe their existence to a position remote from large rivers. Thus, Mount Monadnock, Mount Sunapee, Mount Kearsarge, Mount Cardigan, Smart's Mountain, and Mount Moosilauke all consist of rocks of ordinary or inferior resistance, but they lie along the Connecticut-Merrimac watershed, which has presumably been the main drainage divide of the region for several geological periods and has therefore suffered less reduction than the country on either side. Mount Washington belongs to this class, although its anticlinal structure has been mistaken as evidence that the mountain owes its existence to a local upheaval. In form the White Mountains are subdued, rising with moderate slopes to broad rounded summits. Only a few project in sharp rocky peaks. It is doubtful if continental glaciation anywhere in this region changed the outlines of hill and valley except in minor detail. Conspicuous marks of local alpine glaciers, however, occur on the Presidential Range, where 10 or 12 typical glacial cirques are grouped on the leeward side of the highest peaks. Several of the summits exceed 5000 feet in altitude, and Washington, the highest, reaches 6293 feet.

The 18 miles of seacoast are without notable features. Sandy beaches stretch from one low cape to the next, sheltering tidal creeks and salt marshes. The estuaries are small except in the case of the Piscataqua, which at Portsmouth harbor lies half in New Hampshire and half in Maine. Eight miles offshore is situated a small group of rocky islets, known as the Isles of Shoals, which also is bisected by the State boundary.

Hydrography. From the White Mountains four large rivers—the Connecticut, Merrimac, Saco, and Androscoggin—flow outward to the sea. In reëxcavating their drift-filled valleys these rivers and their tributaries have struck ledges at frequent intervals and there developed rapids and falls. Innumerable ponds and lakes discharge into these rivers and serve as natural storage basins and equalizers of flow. Their occurrence is due to blockades of glacial drift across old rock-floored valleys. They are generally shallow and very irregular. Winnepesaukee, the largest lake, is 16 miles long and 6 wide.

Geology. Although widely known as the "Granite State," New Hampshire is occupied chiefly by schists, gneisses, and other foliated rocks. The north-northeast-south-southwest trend of these rocks is seen throughout, except in the central part of the White Mountains and in a few outlying districts of like character. The structure of the rock formations is so complex that there is much doubt regarding their original character, whether igneous or sedimentary, and still more regarding their sequence and age. Fossils have been found at only one locality, in Littleton, where sandstones, slates, and limestones containing a Silurian fauna overlie and are surrounded by a granite which has been interpreted first as intrusive and subsequently as an underlying basement. It is probable that the great bulk of the foliated rocks are of early Paleozoic age. The tendency at present is to restrict the areas of pre-Cambrian, although there is little doubt that both Archean and Algonkian rocks are well represented.

Climate. The climate is strongly affected by the elevation of the land. It is colder, on the average, than that of Maine, and the winters are severe, the ground being usually snow-covered and the rivers frozen from autumn to spring. The lower Merrimac valley is the warmest part. It is of slight elevation and but little affected by ocean breezes. Here the mean temperature for January is 21°, and for July 70°, the corresponding figures for the northern portion being 16° and 67°, and for Mount Washington 5° and 47°. The climate is quite humid and the precipitation sufficient all over the State. It is especially abundant on the mountain summits, where it reaches 55 inches, and on the east slope of the mountains, where it ranges from 40 to 46 inches. It is least near the seashore and on the west slope, where there is a fall respectively of only 35 and 30 inches.

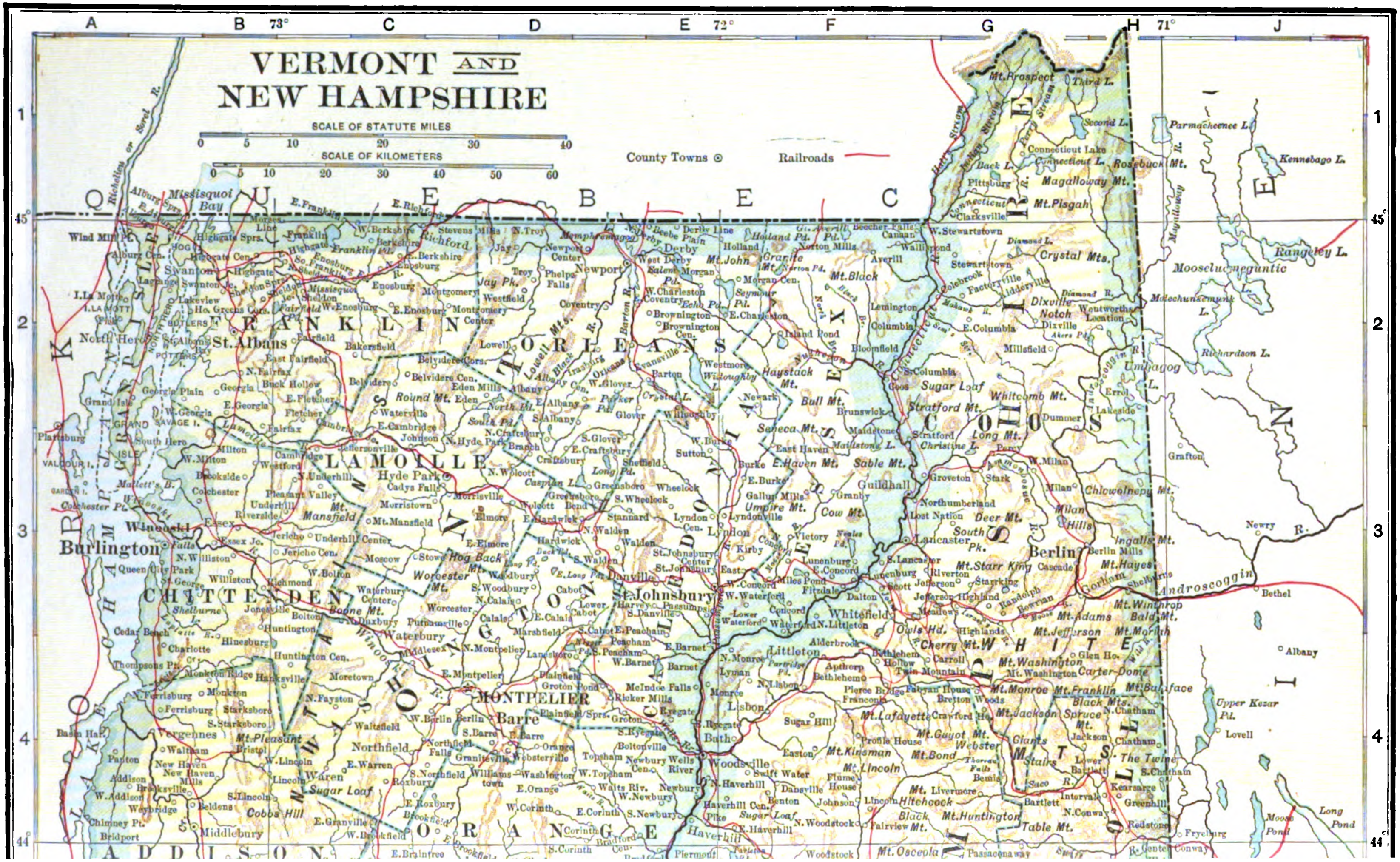
For flora and fauna, see paragraphs under UNITED STATES.

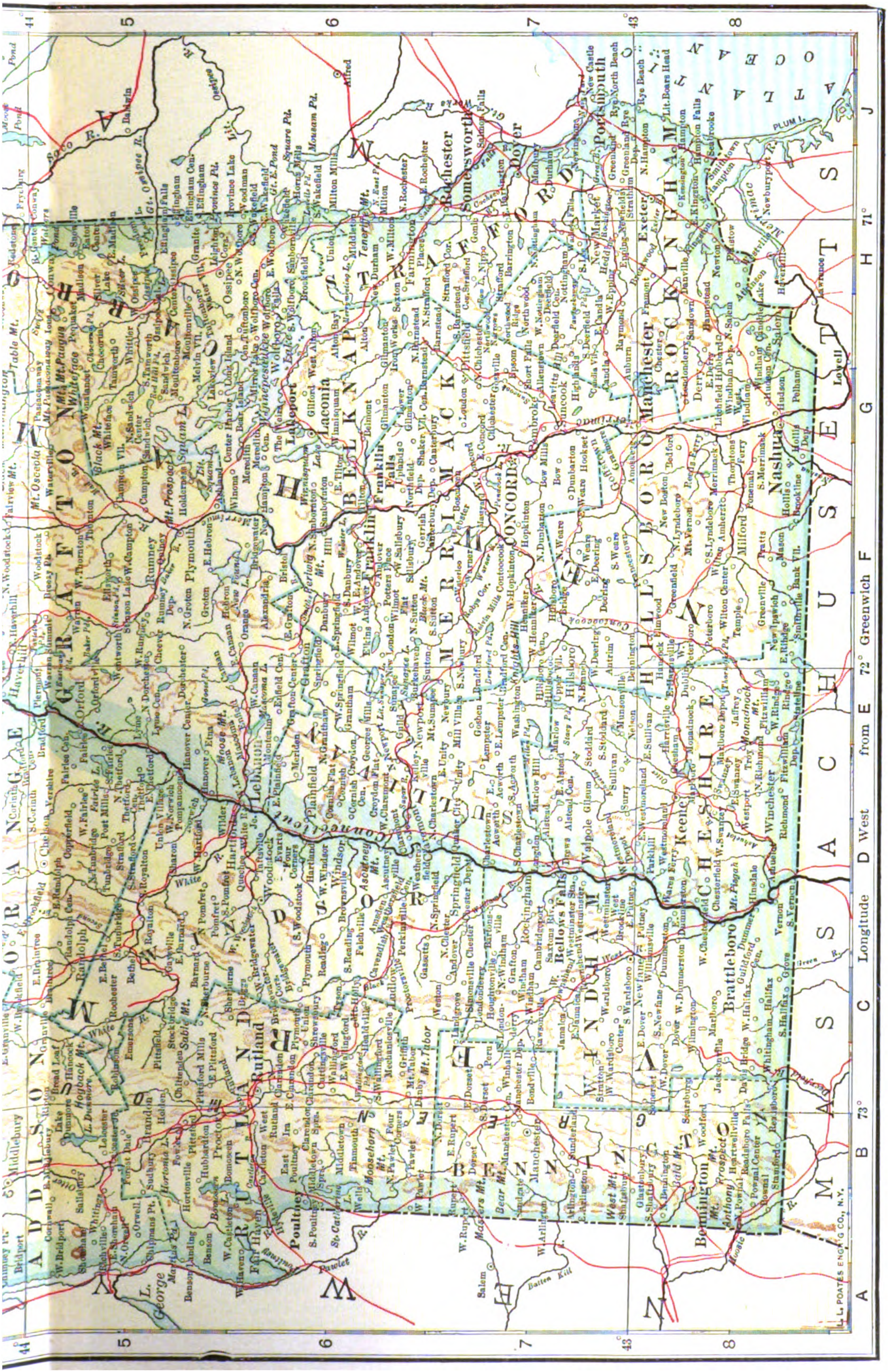
Soils. The soils are of glacial origin and generally poor. On the uplands there is a covering of bowlder clay in which coarse stony material, derived from ledges of granite and gneiss, is abundant. Even in districts remote from outcrops of granite and gneiss, the particles which compose the soil are generally coarse and sandy rather than fine and argillaceous, because of the prevalence of quartzose rocks instead of shales, slates, and limestones. In the valleys extensive flood plains or "intervales" of gravel and silt afford fertile ground. Along the Merrimac glacial river deposits, and along the Connecticut old lake floor silts of great depth and extent have been terraced by the modern rivers and are highly productive. Eskers—winding, steep-sided ridges of gravel which mark the beds of old glacial rivers—and kames of less definite form are common in the valleys. In the low southern part, particularly near the coast, elliptical hills of bowlder clay known as "drumlins" are numerous.

Mineral Production. New Hampshire has little importance as a mining State. The principal product is granite, and in 1913 the output was valued at $1,482,771. This stone is used mainly for building purposes and monumental work. The principal quarrying operations are in Hillsboro, Merrimack, Cheshire, and Carroll counties, in the order named. Bricks are the only commercial product of the clay resources. In 1913 the output was valued at $462,534. Other products are fluor spar, garnet (abcasine), occasional gems, mica, mineral waters, and scythestones. The total value of the mineral products in 1913 was $2,218,925.

Agriculture. Over one-half of the entire land area is in farms, the proportion of farm land being considerably higher in the southern than in the northern portion of the State. Of an approximate land area of 5,779,840 acres, in 1910, 3,249,458 acres were in farms, of which 929,185 acres were improved land. The total number of farms was 27.053, the average acres per farm 120.1, and the total value of farm property, including land, buildings, implements, and machinery, domestic animals, poultry, and bees, $103,704,196. Of the total number of farms in 1910, 25,174 were operated by owners and managers and 1879 by tenants. There were, in 1910, 24,347 native white farmers. Of the 2691

VERMONT AND NEW HAMPSHIRE




ADDISON
ORANGE
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RUTLAND
WINDSOR
SULLIVAN
MERRIMACK
BELKNAP
STRAFFORD
ROCKINGHAM
HILLSBORO
CHESHIRE
WINDHAM
BENNINGTON
MASSACHUSETTS
ATLANTIC OCEAN
Connecticut R.
CONCORD
Manchester
Nashua
Portsmouth
Dover
Keene
Rutland
Brattleboro
Bennington
Laconia
Lebanon
Longitude West from Greenwich
72°
73°
71°
43°
44°
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foreign-born whites, over half were born in Canada.

While farming along general lines is quite extensively followed, yet there is a tendency to specialize in poultry husbandry, dairying, fruit growing, and truck farming. The table below shows the acreage, production, and value of the important crops in 1914 as estimated by the United States Department of Agriculture.

The total value of crops in 1909 was $15,976,000, and the combined acreage was 593,093. The general character of New Hampshire agriculture is indicated by the fact that only 5.5 per cent of the total value of crops in 1909 was contributed by the cereals, while nearly one-half was contributed by hay and forage and over one-fifth by forest products. The census figures for 1909 show in hay and forage an acreage of 529,817, and a production of 582,454 tons, valued at $7,846,143; in corn an acreage of 19,814, and a production of 916,263 bushels, valued at $621,306; in oats an acreage of 10,860, and a production of 386,419 bushels, valued at $216,938; in dry edible beans an acreage of 3180, and a production of 22,546 bushels, valued at $62,783; in buckwheat an acreage of 1052, and a production of 26,312 bushels, valued at $17,842. In 1909 the total acreage of potatoes and other vegetables was 26,225, and their value $2,276,000. Excluding potatoes, the acreage of vegetables was 8855, valued at $1,072,000.

PRODUCTS	Acreage	Prod. bu.	Value
Corn	21,000	966,000	$792,000
Oats	12,000	456,000	264,000
Potatoes	17,000	2,703,000	1,622,000
Hay	520,000	* 598,000	10,166,000

* Tons

Considerable attention is given to the raising of orchard fruits, especially apples. The total quantity of orchard fruits produced in 1910 was 1165,044 bushels, valued at $719,777, of which the apples amounted to 1,108,424 bushels, valued at $637,990. Other orchard fruits are peaches, pears, plums, and prunes. There were also grown in that year 375,164 pounds of grapes, which were valued at $10,926. The most important of the small fruits is the strawberry, of which there were produced, in 1909, 638,057 quarts, valued at $68,552. Considerable quantities of sirup and sugar are produced from the maple forests. The maple sugar and sirup made in 1909 amounted to 558,811 pounds and 111,500 gallons respectively, the combined value of which was $182,341.

Live Stock and Dairy Products. The total value of live stock on farms in 1910 was $11,237,764, and in 1914 it was reported as $14,033,158. On Jan. 1, 1915, the number of cattle other than milch cows was estimated by the United States Department of Agriculture at 64,000, valued at $1,792,000; milch cows, 95,000, valued at $5,700,000; horses, 47,000, valued at $5,969,000; sheep, 38,000, valued at $186,000; swine, 52,000, valued at $728,000.

The value of the milk, cream, and butter fat sold and butter and cheese made in 1909 was $5,589,711. There were sold 21,132,268 gallons of milk, valued at $3,613,676, and there were made 5.065,188 pounds of butter, valued at $1,509,706. The total number of fowls of all kinds in 1910 was 924,859, valued at $649,121.

Forest Products. The manufacture of lumber and timber is an industry of great importance. The production of rough lumber was, in 1909, 649,606 M feet board measure, of lath 26,873 thousand, and of shingles 30,132 thousand. The principal species of native wood are spruce and white pine. In the production of the former New Hampshire ranks second only to Maine and in output of the latter fifth among the States. The mills have already exhausted the original forests of white pine and are now using the second growth. The output of lumber is directly influenced by the increasing consumption of timber in the paper and wood-pulp industry. In addition to the above figures there were produced on the farms in 1910 forest products valued at $3,810,178.

Manufactures. In its manufactures New Hampshire is far more important than in agriculture and in 1909 ranked twenty-eighth in gross value of products, in which year the value of manufactured products per capita was $382. Owing to the abundance of water power afforded by the Merrimac River, the close proximity to the markets and business section of New England, and the excellent transportation facilities, the greater number of the manufacturing establishments are located in the southern part. The table on page 8 gives the most important figures relative to manufactures in 1909 and in 1904.

In 1909 New Hampshire ranked fourth in the manufacture of boots and shoes, with a production of 25,069,572 pairs. Second in value of output is the manufacture of cotton goods, of which by far the most important product as regards both quantity and value is ginghams. The quantity of cotton used as material was 138,532,627 pounds in 1909. The number of spindles was 1,318,932 and the number of looms 40,777. Of the wool-manufacturing industry the most important product is the all-wool woven goods. Of the lumber and timber manufacturing industry, the principal product is rough lumber. Owing to the abundance of spruce and the large amount of water power, the manufacture of paper and wood pulp is of considerable importance, the State ranking eighth in this industry. Spruce is used in the manufacture of wood pulp almost to the exclusion of every other kind of wood except balsam fir. In 1909 the total number of cords of wood used was 349,997. The total value of paper and wood-pulp products was $13,994,000. Other industries of importance, not shown on the table, are those engaged in the manufacture of malt liquors, furniture, refrigerators, and tobacco.

The average number of wage earners in 1909 was 78,658, of whom 54,302 were males. The wage earners under 16 years of age numbered 1196, of whom 728 were males. For the great majority of wage earners the prevailing hours of labor ranged from 54 to 60 a week, or from 9 to 10 a day.

The eight cities with a population of 10,000 or over, Manchester, Berlin, Concord, Dover, Keene, Laconia, Nashua, and Portsmouth, contained, in 1910, 56.5 per cent of the average wage earners and produced 56.5 per cent also of the total value of manufactures. Manchester (q.v.), which gave employment in 1909 to 24,735 wage earners and turned out products valued at $46,811,919, is the most important manufacturing city. Its chief industry is the manufacture of boots and shoes. Second in importance is Nashua (q.v.), with 7312 wage earners and an output valued at $17,326,134.

Transportation. New Hampshire has excellent railroad facilities. The southern half, the manufacturing portion, greatly exceeds in this respect the northern part. The total mileage of railroads operating in 1915 was 1221. The principal roads and their mileage are as follows: Boston and Maine, 1020; Maine Central, 100; Atlantic and St. Lawrence (Grand Trunk), 52.

Banks. The New Hampshire Bank of Portsmouth, the first bank chartered in this State, was the sixth bank chartered in this country. It was the only bank in New Hampshire until 1800, having begun business in 1792. In the next decade following 1800, seven more were created. By 1840 the number had increased to twenty-eight. In 1863, when the National Bank Act was passed, there were fifty-two banks, with a capital of nearly five million dollars, and a circulation of over four million, and deposits of $1,652,000. All of these State banks had become national banks by 1870, only one of which is in existence to-day. It has no circulation, but does simply a commercial business.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	1,961	84,191	78,658	$139,990	$36,200	$164,581	$66,424
	1904	1,618	69,758	65,366	109,495	27,693	123,611	50,395
Boots and shoes, including cut stock and findings.	1909	68	15,113	14,211	12,700	6,897	39,440	11,225
	1904	61	11,329	10,744	8,274	4,494	22,834	7.087
Bread and other bakery products	1909	157	662	454	501	249	1,683	628
	1904	113	514	357	347	188	1,075	423
Cotton goods, including cotton small wares	1909	21	22,504	22,290	29,176	8,938	33,602	14,478
	1904	25	20,044	19,731	31,176	7,373	29,541	11,044
Flour-mill and gristmill products	1909	105	288	116	1,329	62	3,187	378
	1904	72	248	128	1,009	63	2,542	194
Foundry and machine-shop products	1909	81	2,792	2,396	6,179	1,394	4,947	3,248
	1904	77	2,302	2,020	4,267	1,085	3,244	2,072
Hosiery and knit goods	1909	21	3,223	3,129	3,530	1,143	4,764	2,128
	1904	21	2,899	2,790	2,750	943	3,974	1,745
Lumber and timber products	1909	589	9,449	8,464	13,866	3,924	15,284	8,021
	1904	474	7,586	6,789	8,748	2,968	11,573	6,272
Marble and stone work	1909	99	1,718	1,527	1,721	1,062	1,818	1,520
	1904	55	1,156	1,048	969	610	1,205	924
Paper and wood pulp	1909	34	3,668	3,413	27,534	2,106	13,994	4,741
	1904	25	2,674	2,522	14,041	1,315	8,930	3,602
Woolen, worsted, and felt goods, and wool hats	1909	39	9,701	9,486	15,103	3,649	16,731	5,636
	1904	44	6,820	6,581	14,411	2,755	14,284	4,805

Savings banks had their beginning in New Hampshire in 1823, seven years after the first savings bank was incorporated in the United States. Four years earlier an attempt was made to secure a charter for a savings bank. The bill passed the House, but was defeated in the upper branch of the Legislature. Two savings banks were incorporated in 1823. In 1850 the total deposits were only $1,600,000. The increase from this time until the present has been almost constant, except during the panic of 1893. Then very nearly one-fourth of the savings institutions went into liquidation. Recovery from the panic was rapid and healthy. The total deposits just prior to these failures were $77,000,000, held by 83 savings institutions. To-day there are 66 savings institutions, with approximately $110,000,000 of deposits.

Trust companies were first chartered in 1885. If they receive savings deposits they are required to conduct that business as a separate department, and that department is amenable to the saving bank laws of the State. There are 12 trust companies at the present time, with a capital of $555,000, a surplus of $550,000, business deposits of $1,579,155, and savings deposits of $5,608,742. On Sept. 12, 1914, there were 56 national banks, with an aggregate capital of $5,285,000; a surplus of $3,488,800; cash, etc., $801,220; loans, $19,960,129; deposits, $21,404,074. On June 30, 1914, there were 11 State banks, with a capital of $505,000; a surplus of $553,529; cash, $134,412; loans, $5,388,693; deposits, $7,064,412.

Government. The constitution was adopted in 1877. Every seven years a vote is taken to decide whether it shall be revised. Two-thirds of the qualified voters of towns and unincorporated places must vote for such revision before it can be undertaken. Constitutional delegates are chosen in the same manner and in the same proportion as representatives to the General Court.

Legislative.—The Legislature, consisting of the Senate and the House of Representatives, together designated the General Court, meets biennially on the first Wednesday in January. The House of Representatives is composed of members from each town, and wards of cities, one for a minimum population of 600, and one for each additional 1200. Towns of less than 600 are entitled to one representative for such proportional part of the session as the population bears to 600.

Executive.—The supreme power is vested in the Governor, who is chosen biennially. Prior to 1913 a majority of votes was necessary to elect a Governor, but in that year the constitution was so amended as to enable a plurality to elect. The Governor must be at least 30 years of age and have been an inhabitant of the State for seven years next preceding his election. There are also elected by ballot biennially five councilors as advisers to the Governor. The other executive officers, the Secretary, Treasurer, and Commissary General, are chosen by joint ballot of the Representatives.

Judiciary.—The judiciary consists of a supreme court, a superior court, and inferior courts. The supreme and superior courts are each composed of a chief justice and four associates. Practically all the judicial officers are appointed by the Governor. The term of office is indefinite for all except justices of the peace, whose terms are five years.

Suffrage and Elections.—Every male citizen of the United States who has reached the age of 21 years and who has resided in one town six months is entitled to vote, provided that he is able to read the Constitution in the English language, unless he is prevented by some physical disability, or was 60 years of age or upward on Jan. 1, 1904. The Legislature of 1913 passed a measure providing for the nomination and election of United States Senators by the people. It also enacted a measure providing for the election, by direct vote, of delegates to the national convention.

Local and Municipal Government.—In each county, county treasurers, registers of probate, solicitors, sheriffs, and registers of deeds are elected. The cities under the general State law regularly elect a mayor, a board of aldermen, and a common council.

Miscellaneous, Constitutional, and Statutory Provisions.—Sleeping, dining, and parlor cars operating within the State are taxed. In prosecutions for bribery no witness is to be excused because his testimony would tend to incriminate him, but in such a case he is not to be prosecuted. There is a child-labor law relative to all children under 14 and to illiterates under 16. The State has also a workmen's compensation law. The Legislature of 1913 passed a mother's pension law and a family-desertion act. The same Legislature created a department of agriculture and enacted measures to assist in the suppression of tuberculosis. The hours of labor in certain occupations for women and minors is limited to 11¼ per day and 55 per week. There is a board for the arbitration of labor disputes. By a local-option provision all towns are required to vote once in two years, and the cities once in four years, on the question of license or no-license.

Finances. Up to the beginning of the Civil War the debt was insignificant, amounting to $60,000 in 1860. The war expenditures made loans necessary, and their aggregate sum rose to $4,230,000 in 1865. The total expenditures of the State treasury for war purposes were $6,852,678, only $897,122 of which was repaid by the Federal government. The State debt was gradually reduced, and by 1872 it amounted only to $2,205,695. In that year, however, the Commonwealth assumed the Civil War debt of the towns and cities, increasing the State debt to $4,138,124. The financial condition has been sound since then, and the debt is being reduced at the rate of from $100,000 to $200,000 a year. The chief sources of revenue are the State tax, the corporation taxes, automobile fees, etc. The principal expenditures are for education, highway construction, ordinary State expenses and maturities, interest, etc. In the fiscal year ending Aug. 31, 1914, the total receipts were $4,025,125, the disbursement $3,283,195, leaving a balance on hand of $741,930. The net indebtedness of the State on Sept. 1, 1914, was $963,503.

Militia. The males of militia age in 1910 numbered 90,357. The organized militia comprised a regiment of infantry, a troop of cavalry, a battalion of field artillery, a detachment of signal troops, four companies of coast artillery, and two detachments of sanitary troops. The total strength was 1164 men and 94 officers.

Population. The population by periods is as follows: 1790, 141,885; 1820, 244,022; 1850, 317,976; 1860, 326,073; 1870, 318,300; 1890, 376,530; 1900, 411,588; 1910, 430,572. The estimated population in 1914 was 438,662. The population per square mile in 1910 was 47.7. The State lost largely in the latter part of the nineteenth century through immigration to the Western States, but in recent years this outflow has been offset to a considerable extent by the increase in the immigration of foreign-born population, particularly French Canadians. The urban population, i.e., that of places of 2500 or more, was, in 1910, 255,099, and the rural population, 175,473. The native whites of native parentage in that year were 230,231; the native whites of foreign or mixed parentage, 103,117; the foreign-born whites, 96,558. Of the foreign-born whites the largest number came from Canada and Ireland. By sex the population was divided in 1910 into 216,290 males and 214,282 females. The males of voting age numbered 136,668. There were in that year nine cities with a population of 8000 or over. The largest city is Manchester, with a population in 1910 of 70,063, and in 1914 (estimated) of 75,635. Other cities with their populations in 1910 are as follows: Nashua, 26,005; Concord, 21,497; Dover, 13,247; Berlin, 11,780; Portsmouth, 11,269; Laconia, 10,183; Keene, 10,068; Rochester, 8868.

Education. Much attention was given to education in New Hampshire even before it became a separate State. In 1767 the General Court of Massachusetts enacted a measure requiring every town in which there were 50 householders to maintain a school for teaching reading and writing; and every town in which there were 100 householders to maintain a grammar school. In the latter part of the eighteenth century Phillips Exeter Academy was founded, and this was followed by several other similar schools. The State has always been among the most advanced in educational administration and methods. The total school population (ages, 6 to 20) in 1910 was 111,634. The number of illiterates in 1910 was 16,386, or 4.6 per cent of the total population. Among native whites of native parentage the percentage of illiteracy was 0.8 and among foreign-born whites 14.5. The report of the State Superintendent of Public Instruction shows 78,677 children between the ages of 5 and 16 in 1914. Of this number 63,991 were registered in the public schools. There were, in 1914, 2491 women teachers and 89 men teachers. The average monthly salary for women teachers was $42.18 and of men teachers $65.91. The expenditures for public schools in 1913 was $1,931,604.

Provision is made for the education at public expense of youths residing in towns where no high school is maintained. The Superintendent of Public Instruction is required to hold at least one teachers' institute in each county during the year. Under a Union Superintendency Act passed in 1899, whenever two or more school districts unite for the purpose of employing a certificated superintendent of schools the State pays one-half his salary. There are courses of industrial education in nearly all of the secondary schools. These include courses in household arts, commerce, agriculture, and mechanic arts. There are normal schools at Keene and Plymouth. The institutions of higher rank include Dartmouth College at Hanover, the New Hampshire College of Agriculture and Mechanic Arts at Durham and St. Anselm's College (Roman Catholic) for men at Manchester. Phillips Exeter Academy at Exeter and St. Paul's School at Concord are among the most famous schools for boys in the United States.

Charities and Corrections. The charitable and industrial institutions include the New Hampshire School for Feeble Minded, the New Hampshire Soldiers' Home at Tilton, New Hampshire State Sanatorium at Benton, the State Hospital for the Insane at Concord, the New Hampshire State Prison in Concord, and the county alms houses and farms. The penal institutions include the State Prison at Concord, the State Industrial School at Manchester, and the county houses of correction; all these are under the control of the State Board of Charities and Corrections. The dependent children are placed by the county committees in orphanages or in family homes. The Legislature of 1913 made provision for registering the blind in order that they may be given systematic care and education. There is a juvenile court law applicable to children under 17 years of age.

Religion. The Roman Catholic element amounts to about 10 per cent of the total population of the State. The principal Protestant denominations are the Congregational, with about 20 per cent of all the church members; the Baptist, with over 17 per cent; and the Methodist, with about 12 per cent.

History. The first explorer of this region was probably Martin Pring, who anchored in Piscataqua harbor in 1603. It was included in the grant to the Council for New England in 1620, and this body on Aug. 10, 1622, granted to John Mason and Sir Ferdinando Gorges all the land lying between the Merrimac and Kennebec for 60 miles inland, under the title "Province of Maine." The next year David Thomson settled at Little Harbor. In 1627 Edward Hilton settled at Dover Neck, securing a patent in 1629 or 1630. The Province was divided Nov. 7, 1629, and that part lying between the Merrimac and the Piscataqua fell to Mason. In November, 1631, Mason and Gorges, together with a number of merchants, received from the Council territory lying on both sides of the Piscataqua within the territory already granted to them. Several trading stations were founded, the most important of which was Strawberry Bank (Portsmouth). Many settlers came out, but the proprietors derived little profit from the colony. When the Council dissolved in 1635, Mason was confirmed in all his grants and received 100,000 acres more west of the Kennebec. The settlement of Exeter was founded by Rev. John Wheelwright in 1638 after his expulsion from Massachusetts Bay. All these settlements were practically independent and with little form of organized government. Mason was a busy man who paid little attention to this Province, which was named for his native Hampshire in England. Massachusetts Bay looked with disfavor upon the settlements of Royalists and Churchmen and laid claim to the territory. In 1641 all the settlements except Exeter were joined to Massachusetts, and Exeter followed in 1643. Mason's grandson, Robert Tufton Mason, applied to the King for restitution of the territory granted to his ancestor. A decision that Massachusetts had usurped possession was secured in 1677, and in 1679 a decree declaring New Hampshire a royal province was issued, but Mason received little satisfaction. It remained a royal province until the Revolution, but its existence was dependent entirely upon the King's will, as no charter was issued. The Governor of Massachusetts was often commissioned the Governor of New Hampshire as well. After the expulsion of Andros in 1689 New Hampshire asked to be incorporated with Massachusetts, but was refused. The colony suffered greatly in the Indian wars of the eighteenth century, but nevertheless gradually extended its settlements north and west. Boundary disputes were frequent. The dispute over the southern and eastern boundaries was settled in 1740, but the question of the possession of Vermont was not settled until 1764. During the Revolution New Hampshire bore a conspicuous part. The Continental Congress, from which counsel was asked, advised the formation of a temporary State. A convention at Exeter, December–January, 1775–76, adopted a brief constitution. In 1779 a constitution was submitted to the people, but was rejected. A convention, June 12, 1781–Oct. 31, 1783, framed a new constitution, which was ratified and went into effect June 2, 1784. Another convention, Sept. 7, 1791–Sept. 5, 1792, drafted a third constitution, which was ratified during the session of the convention. This provided that the question of the expediency of revision must be submitted to the people every seven years. Accordingly modifications were made in 1852, 1877, 1889.

The State was the ninth to ratify the Federal Constitution, June 21, 1788, thus making certain the establishment of the United States. The capital of the Province of New Hampshire was Portsmouth. Until 1805 it was migratory, but at that date Concord was chosen. New Hampshire was Federalist in national politics till 1816, with the exception of 1804, when it voted for Jefferson. From 1816 to 1852 it was consistently Democratic. From 1856 to 1912 it was stanchly Republican. In the State election held in November, 1906, no candidate for Governor received a majority of the votes. By a provision of the constitution at that time in force, a majority vote was essential to election.

Accordingly the Legislature in 1907 elected Charles M. Floyd Governor. The political issues in the early years of the twentieth century involved a reform of the laws relating to railroads (which at that time had very strong political influence), taxation reform, and direct primaries. The leader of the reform element was Winston Churchill, a well-known novelist. Although the reformers were not able to elect their candidates in 1906, they were strong enough to compel the Republican party to adopt stringent declarations for progressive reform legislation. In the election of 1908 Taft received 53,149 votes, and Bryan 33,655. Col. H. B. Quinby, Republican, was elected Governor. The Legislature in this year enacted drastic measures for the control of railroad influence, a direct-primary law, and an antilegislative lobby law. In 1910 the Republicans carried the State, electing Robert P. Bass Governor and a Republican Legislature. The Legislature of 1911 created a Public Service Commission having power to regulate the railroads. In 1912 three amendments were added to the constitution. They provided for the disqualification of voters convicted of certain crimes, for the election of officers by plurality votes, and for the changing of the basis of councilor districts from property to population. In 1912 Wilson received 34,724 votes; Taft, 32,961; and Roosevelt, 17,695. For Governor, Samuel D. Felker, Democrat, received 34,203 votes, and Franklin Worcester, Republican, 32,504. As no candidate for Governor received a majority of the votes, the election was thrown into the Legislature of 1913, where Mr. Felker was elected Governor by a coalition of Progressive and Democratic votes. Henry F. Hollis was elected United States Senator. In 1914 the Republicans elected their candidate, Walter H. Spaulding, for Governor. Jacob H. Gallinger was reëlected United States Senator. The following is a list of the Governors of the Colony and State of New Hampshire:

AS A ROYAL PROVINCE

PRESIDENTS

John Cutts	1679–80
Richard Waldron	1681

GOVERNORS

Edward Cranfield	1682–85
Walter Barefoote	1686
Joseph Dudley	1686
Edmond Andros	1686–89
Simon Bradstreet	1690–92
Samuel Allen	1692–98
Richard Coote, Earl of Bellomont	1699–1701
Joseph Dudley	1702–14
Samuel Shute	1716–24
William Burnet	1728–29
Jonathan Belcher	1730–40
Benning Wentworth	1740–67
John Wentworth	1767–75

AS A STATE

Matthew Thornton, President Provincial Convention	1775
Meshech Weare, President of the State	1776–84

PRESIDENTS UNDER THE CONSTITUTION OF 1784

Meshech Weare	1784
John Langdon	1784–85
John Sullivan	1786–87
John Langdon	1788
John Sullivan	1789
Josiah Bartlett	1790–92

GOVERNORS OF THE STATE

Josiah Bartlett	Federalist	1792–94
John T. Gilman	“	1794–1805
John Langdon	Democrat-Republican	1805–09
Jeremiah Smith	Federalist	1809–10
John Langdon	Democrat-Republican	1810–12
William Plumer	“ “	1812–13
John T. Gilman	Federalist	1813–16
William Plumer	Democrat-Republican	1816–19
Samuel Bell	“ “	1819–23
Levi Woodbury	“ “	1823–24
David L. Morrill	“ “	1824–27
Benjamin Pierce	“ “	1827–29
John Bell	Democrat	1829–30
Matthew Harvey	“	1830–31
Joseph M. Harper (acting)	“	1831
Samuel Dinsmoor	“	1831–34
William Badger	“	1834–36
Isaac Hill	“	1836–39
John Page	“	1839–42
Henry Hubbard	“	1842–44
John H. Steele	“	1844–46
Anthony Colby	“	1846–47
Jared W. Williams	“	1847–49
Samuel Dinsmoor	“	1849–52
Noah Martin	“	1852–54
Nathaniel B. Baker	“	1854–55
Ralph Metcalf	American	1855–57
William Haile	Democrat	1857–59
Ichabod Goodwin	Republican	1859–61
Nathaniel S. Berry	“	1861–63
Joseph A. Gilmore	“	1863–65
Frederic Smyth	“	1865–67
Walter Harriman	“	1867–69
Onslow Stearns	“	1869–71
James A. Weston	Democrat	1871–72
Ezekiel Straw	Republican	1872–74
James A. Weston	Democrat	1874–75
Person C. Cheney	Republican	1875–77
Benjamin F. Prescott	“	1877–79
Natt Head	“	1879–81
Charles H. Bell	“	1881–83
Samuel W. Hale	“	1883–85
Moody Currier	“	1885–87
Charles H. Sawyer	“	1887–89
David H. Goodell	“	1889–91
Hiram A. Tuttle	“	1891–93
John B. Smith	“	1893–95
Charles A. Busie	“	1895–97
George A. Ramsdell	“	1897–99
Frank W. Rollins	“	1899–1901
Chester B. Jordan	“	1901–03
N. J. Bachelder	“	1903–05
John McLane	“	1905–07
Charles M. Floyd	“	1907–09
Henry B. Quinby	“	1909–11
Robert P. Bass	“	1911–13
Samuel D. Felker	Democrat	1913–15
Walter H. Spaulding	Republican	1915–

Bibliography. Barstow, *The History of New Hampshire* (Boston, 1853); Sanborn, *New Hampshire* (ib., 1904); McClintock, *History of New Hampshire* (New York, 1889); *New Hampshire State Library Annual Report* contains bibliography (Concord, 1891).

NEW HAMPSHIRE COLLEGE. A State institution for agricultural and scientific education founded at Durham, New Hampshire, in 1866. The curriculum includes courses in agriculture, arts and sciences, engineering, and a two-year course in industrial mechanics. The arts and science course includes home economics and mechanic arts for teachers. In 1916 a department of education will be established. Tuition to New Hampshire students is free and is provided for by 400 scholarships. The students in 1914–15 numbered 514, of whom 86 were women, and there were 50 instructors. The endowment amounted to $940,000, and the net income to $18,000. The college grounds and buildings and equipment were valued at $500,000. The library contains about 35,000 volumes. The president in 1915 was Edward T. Fairchild, A.M.

NEW HANOVER. The northernmost large island of the Bismarck Archipelago (q.v.).

NEW HARMONY. A town in Posey Co., Ind., 15 miles (direct) north of Mount Vernon, the county seat, on the Wabash River and on a branch of the Illinois Central Railroad (Map: Indiana, B 8). It has the large free library of the Workingmen's Institute, founded in 1838. There are flouring mills, brickworks, and minor industries. The electric-light plant is owned by the town. Pop., 1900, 1341; 1910, 1229.

New Harmony was settled in 1814 by a community of Harmonists (q.v.), who in 1824 sold out to Robert Owen and moved to Economy, Pa. In 1825 Owen organized a "Preliminary Society" and invited here "the industrious and well disposed of all nations." There was to be a community of goods according to age, religious worship was to be replaced by a series of "moral lectures," and children, when two years of age, were to be taken from their parents and educated by trained teachers. Within a few months the village became a "scene of idleness and revelry," but in 1826 Owen returned, and for a time the settlement prospered. Later in the year, disagreements arising, the original community separated to form three communities—New Harmony, Macluria, and Feiba Pevla—and in a short time the whole experiment was abandoned. William Maclure, one of the original leaders, then bought part of the land and founded a "school of industry," which after a short time was discontinued. One of the members of the colony was Thomas Say (q.v.), the noted American zoölogist, who published his great work on conchology here in 1830. New Harmony was also the home of Dr. David Dale Owen, the eminent geologist. Consult G. B. Lockwood, *The New Harmony Communities* (New York, 1905).

NEWHA'VEN. A seaport town and urban district in Sussex, England, on the English Channel at the mouth of the Ouse, 8½ miles east of Brighton (Map: England, G 6). It is a bonding port with a good harbor, a large coasting trade, and double daily service to Dieppe, France. In 1911 the imports amounted to 433,786 tons; exports, 423,626 tons. The principal articles of export are woolen, cotton, silk, and hat manufactures, leather, silver plate, pictures, paper, machinery and mill work, cycles, hardware and cutlery, and chemical products; the imports include agricultural produce and provisions of all kinds, cotton, woolen, silk, and linen manufactures, gloves, India-rubber goods, glassware, wines, spirits, sugar, tobacco, and timber. It has a considerable coasting trade in corn, timber, and coal. It is a terminus of the London, Brighton, and South Coast Railway, a coast-guard station, and is protected by a large modern fort. Its twelfth-century Norman church has an unusually good Norman tower. Pop., 1901, 6772; 1911, 6665.

NEW HAVEN. The county seat of New Haven Co., Conn. The head of New Haven Bay, 4 miles from Long Island Sound, 73 miles from New York, and the largest city in the State (Map: Connecticut, D 4).

Between East Rock (360 feet) and West Rock (400 feet), on a level plateau 18 square miles in area, bounded east and west by the Quinnipiac and West rivers and by a rolling hill country to the north, New Haven is most attractively situated. It is within easy reach by trolley of delightful resorts along the Sound from Woodmont on the west to Pine Orchard and the Thimble Islands on the east. While the appropriateness of its title, "City of Elms," is disappearing with the removal of the old elms, New Haven's 200 miles of streets are still shaded by 24,000 trees, of which 20,280 are in the central wards. The civic centre is the Green of 16 acres which remains as laid out by the original settlers and is under the control of the "Proprietors' Committee," a close corporation. The park system comprises 1200 acres, including East Rock Park (408 acres) with a Soldiers' and Sailors' Monument and the beginnings of a Zoo at the "Farm"; West Rock Park (281 acres) with "Judges Cave," where tradition says that the regicides, Goffe and Whalley, sought concealment in 1661; Edgewood Park (118 acres) with a flock of fancy waterfowl and playgrounds; Beaver Ponds Park (114 acres); Fort Hale Park (49.5 acres) with public bathhouses; Bay View Park (23.3 acres); Fort Wooster Park (17 acres); Clinton Park (12 acres); Quinnipiac Park (17 acres); and Waterside Park (17.5 acres) with a municipal dock. The other city squares occupy 37 acres.

Points of interest in the vicinity of the Green include the buildings of Yale University (q.v.), particularly the Art School and Peabody Museum, the three historic churches on the Green, the University Library (900,000 volumes), the Ives Memorial Public Library (117,000 volumes), the New Haven Colony Historical Society, the new county courthouse, the new post office, and the Taft Hotel. There are 11 hospitals; the more prominent are the New Haven General Hospital, Grace Hospital, St. Raphael's, and the Elm City Private Hospital. Among the city charities are six orphanages, Springside Alms House, Lowell House, Florence Crittenton Home, and the City Missionary Society. Of the 12 cemeteries, Grove Street Cemetery is of historic interest, being probably the first cemetery to be laid out in family plots. Here lie buried Theophilus Eaton, Noah Webster, Roger Sherman, Timothy Dwight (1752–1817), Theodore Winthrop, Eli Whitney, William D. Whitney, Benjamin Silliman, James D. Dana, Lyman Beecher, Rear-Admiral Andrew H. Foote, Gen. David Humphrey, Maj.-Gen. Alfred H. Terry, several presidents of Yale, and many other eminent men.

As an educational centre New Haven contains Yale University with 3300 students, private schools with 3500 pupils, the New Haven Normal School of Gymnastics, Hopkins Grammar school (founded 1660). Public schools number 55 with an enrollment of 27,185 pupils (1914) and 699 teachers, 74 men and 625 women. The cost of education per pupil in 1913 was $31.07 and the average salary of teachers $787. In addition to the Hillhouse High School and Boardman Manual Training School there is a Trade School with 170 students.

New Haven has five theatres: Shubert's, adjoining the Taft Hotel, Hyperion, Grand Opera House, Bijou, and Poli's Vaudeville Theatre. Woolsey Hall, containing the Newberry organ, affords unusual facilities for symphony concerts, oratorios, recitals, etc. Of the numerous clubs the more prominent are the Graduates Club, the Quinnipiac Club, both facing the Green, the Union League, and a progressive woman's club. The Taft Hotel, at the corner of Chapel and College Streets, is one of the best hotels in New England; among others are the Garde (opposite the station), the Bishop, and the Duncan. New Haven's newspapers comprise the *Morning Journal and Courier* (1832, Rep.), the *Evening Register* (weekly 1812, daily 1840, Independent), the *Union* (1873, Dem.), the *Saturday Chronicle* (1902).

Six branches of the New York, New Haven, and Hartford Railroad, whose main offices are in New Haven, emanate from the city: the main line to New York, the Shore Line eastward, the Air Line to Willimantic and Boston, the Hartford, the Northampton, and the Berkshire Divisions. The Connecticut Company maintains efficient electric car service over 172 miles of track in New Haven and vicinity, and its express department provides a trolley freight service over most of its lines in Connecticut. Two lines of steamers, operated by the New England Navigation Company and Starin's Line, connect with New York. In summer a steamer with provision for automobiles connects with Port Jefferson, Long Island. New Haven is a distributing point for coal, lumber, cement, and fertilizers imported by water. Its export trade, which is considerable, is carried on chiefly through New York. New Haven's industries, by the census of 1910, comprise 590 establishments, with 31,382 primary horse power, 26,874 employees, an invested capital of $52,014,000, paying salaries amounting to $3,462,000, and wages amounting to $12,776,000. The cost of materials amounted to $24,319,000; the value of the finished products was $51,071,000, the value added by manufacture being $26,752,000. The manufactures include firearms and ammunition, hardware, clocks, rubber goods, corsets, foundry and machine-shop products, boxes, slaughtering and meat-packing products, sewing-machine attachments, wire and wirework. There are large railroad repair shops. The oyster business is also an important industry. Altogether there are 15 banks.

The town and city of New Haven are coextensive, and the functions of the town government have been largely absorbed by the city government. This is vested in a mayor, elected every two years, and a board of aldermen (6 at large and 1 from each of the 15 wards), and in administrative officers, the majority of whom are appointed by the mayor, with the following exceptions: assistant city clerk, elected by the aldermen; and city clerk, controller, sheriff, treasurer, and tax collector, chosen by popular vote. The estimated income of the city for 1915 was $3,040,985.34, and of the expenditures allowed the more important were as follows: education $1,046,658, public works $383,595 (cleaning, sprinkling, and oiling streets $108,500), fire department $274,567, police $256,453, charities and correction $132,169, lighting $88,000, parks $82,500, library $38,500. The assessed valuation of property, real and personal, was $148,500,708, including exemptions. The net bonded debt was $4,120,648.63 in 1915.

Pop., 1800, 4049; 1840, 12,960; 1850, 20,345; 1890, 81,298; 1900, 108,027; 1910, 133,605, including 92,218 of foreign birth or foreign parentage, of whom 27,084 were Irish, 21,919 Italian, 12,781 Russian, 11,090 German. There were 3651 negroes. In 1915 the estimated population was 150,000.

In 1637 a small company of Puritans, under John Davenport, their pastor, and Theophilus Eaton, a wealthy London merchant, arrived in Boston, and in April, 1638, settled at New Haven, called by the Indians Quinnipiac. In November the new settlers bought from the Indian chief Momauguin a large tract of land. Another tract was purchased in December from the Indian chief Montowese. Immediately after landing the settlers entered into a "plantation covenant," but a regular government was not established until the "Fundamentall Agreement" was adopted June 4, 1639. The privileges of voting and holding office were limited to church members, and the scriptures were solemnly proclaimed the supreme and only law in civil and ecclesiastical affairs. Eaton was chosen first governor and was successively reëlected until his death in 1658. In 1640 the settlement received its present name (from Newhaven, England), and in 1643 it formed with Milford, Guilford, Stamford (Southold, L. I., and Branford being admitted in 1649 and 1651), a confederacy known as the "New Haven Colony," which in the same year entered the New England Confederation. In 1665, after a long and bitter struggle, the New Haven Colony was united to Connecticut under the Connecticut charter of 1662. From 1701 to 1873 New Haven was the joint capital with Hartford. In 1716 Yale College was moved here from Saybrook. July 5, 1779, a British force under Tryon and Garth captured the town after sharp skirmishes and remained here until the 7th. In 1784 New Haven was incorporated as a city. Until after the Hartford Convention (1814) the city was strongly Federalist. In the War of 1812 New Haveners, among whom was Capt. Isaac Hull, engaged heavily in the navy and privateering. Steamboat communication with New York began in 1815. From 1824 to 1854 was a period of Whig ascendancy owing to the rise of manufactures. West Indian trade, interrupted by the embargo and War of 1812, was renewed from 1830 to 1880. New Haven's market for manufactures was largely in the South, and antislavery feeling was never strong in this city. Since 1860 the Democratic party has, with a few exceptions, dominated city politics.

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NEW HEBRIDES, hĕb′rĭ-dēz. A group of islands in the Pacific Ocean, northwest of Australia, extending from lat. 13° to 20° 30′ S. and from long. 168° to 170° E. (Map: Australasia, J 4). Its total area is estimated at over 5000 square miles. The chief islands are Espiritu Santo, Efate, Epi or Tasiko, Amboina, Aragh Aragh (Pentecost or Whitsunday), Maewo (Aurora), Aoba (Leper Island), and Malikula. Some of the islands are composed of coral; others are of volcanic origin with several active volcanoes. An eruption in 1913–14 completely changed the face of Ambryn Island. The soil is fertile. Considerable quantities of sandalwood are exported. The chief agricultural products are breadfruits, sago palms, bananas, yams, pineapples, oranges, copra, coffee, etc. The chief imports are clothing, metal work, furniture, and provisions. The climate is unhealthful. Even the natives are not immune from fever, and dysentery makes great ravages among them. The people of this group of islands are Melanesians. They are chiefly dolichocephalic (cranial index, 70.4, but examples as high as 85 are found), very dark in complexion, below the medium in stature (64 inches), and some have an abundance of woolly hair. They were formerly savages, but under the teachings of Christian missionaries have abandoned head-hunting, cannibalism, and other primitive customs. The many languages of New Hebrides belong to the sub-Papuan family everywhere except in Fotuna and Aniwa, and at Mel and Fel in Efate, which are Maori colonies from New Zealand still speaking Maori dialects. The best-known sub-Papuan languages are Epi, Pama, Ambrym, Vunmarama, and Sesaki. On the southernmost island, Aneiteum, the inhabitants are Christianized and can all read and write.

The New Hebrides group was first discovered by the Portuguese in the early part of the seventeenth century. The islands were visited and named by Captain Cook in 1774 and were neutralized in 1778. Serious native uprisings made it necessary for England and France to protect their interests jointly. In 1906 an Anglo-French convention provided that the islands should be jointly administered by these two countries. Each appointed a high commissioner. In 1914 a conference was held in London to consider a revision of the 1906 agreement, but its work was interrupted by the outbreak of the European War. The population is about 70,000. Consult: M. W. Paton, *Letters and Sketches from the New Hebrides* (4th ed., London, 1896); Great Britain, Foreign Office, *Australasia: Correspondence Relating to the Convention with France* (ib., 1907); Auguste Brunet, *Le régime international des Nouvelles-Hebrides* (Paris, 1907); B. E. Grimshaw, *Fiji and its Possibilities* (New York, 1907).

NEW HOLLAND. The former name for Australia (q.v.).

NEW IBE'RIA. A town and the parish seat of Iberia Parish, La., 125 miles west of New Orleans, at the head of navigation on the Bayou Teche and on the Morgan's Louisiana and Texas, the Franklin and Abbeville, and the New Iberia and Northern railroads (Map: Louisiana, F 6). This region has many natural features of interest and is the scene of part of Longfellow's *Evangeline*. Avery's Island is famous for its deposits of rock salt. Among the noteworthy structures are the post office, high-school library, a fine city hall, Mt. Carmel Convent, the courthouse, and a public market. New Iberia is the centre of a productive agricultural district devoted to the cultivation of sugar cane, cotton, rice, corn, potatoes, small fruits, and vegetables. It is also of considerable importance as an industrial centre, its establishments including shipyards, foundries and machine shops, a knitting mill, and manufactories of cypress lumber, shingles, sash, doors, and blinds, cypress cisterns and tanks, cotton-seed products, soap, tabasco sauce, pressed and common brick, wagons, and carts. In the vicinity are two large salt mines. New Iberia has adopted the commission form of government. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 6815; 1910, 7499.

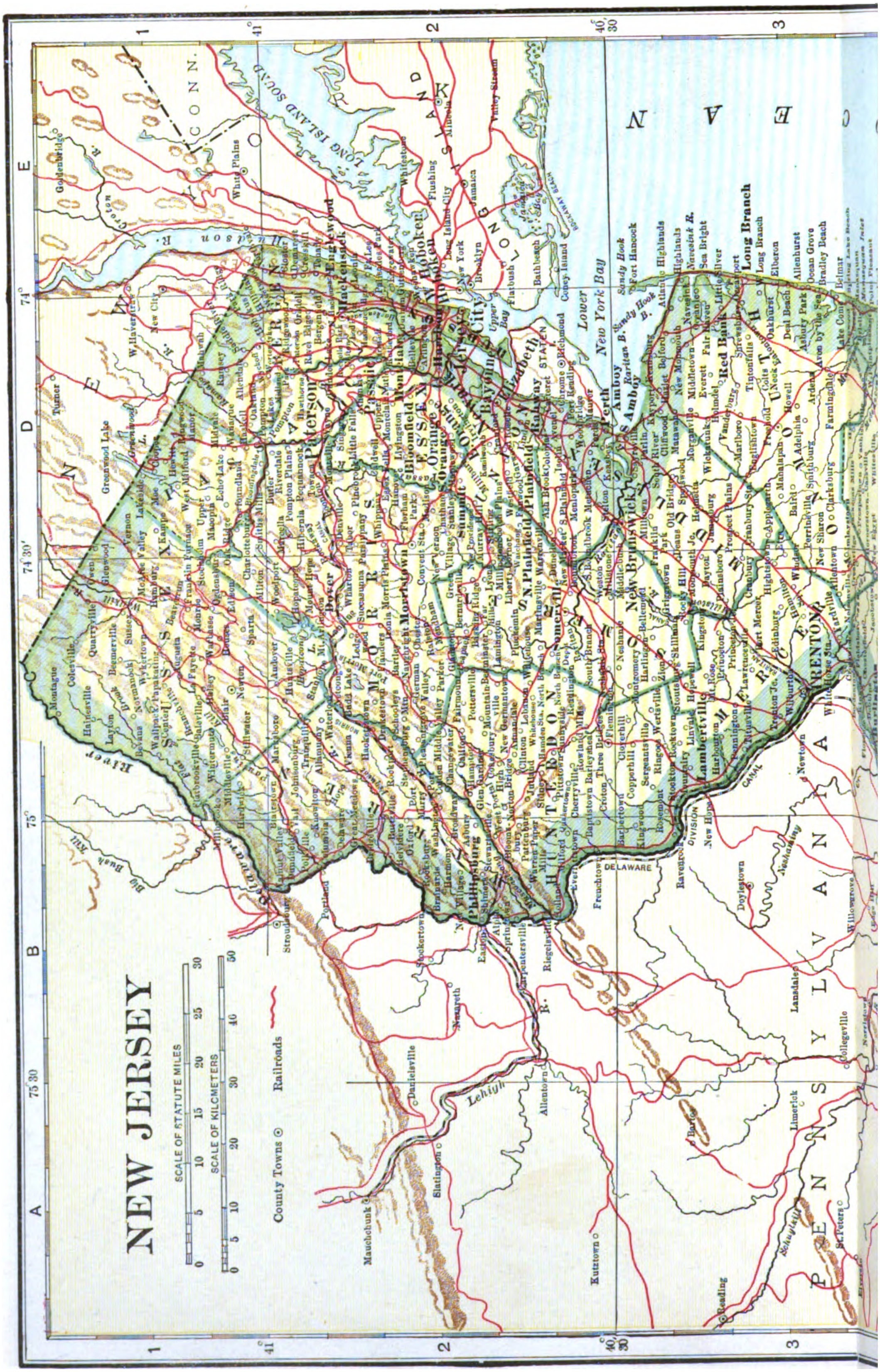
NEW INN HALL. See OXFORD UNIVERSITY.

NEW IRELAND. See NEW MECKLENBURG.

NEW JERSEY. A Middle Atlantic State of the United States. It lies between lat. 38° 56′ and 41° 21′ N. and long. 73° 54′ and 75° 35′ W. It is bounded on the north by the State of New York, on the east by the lower Hudson River, New York Bay, and the Atlantic Ocean, on the south and west by Delaware Bay and River. All but 48 miles out of 487 are natural boundaries. Its extreme length is 166 miles, and its average width 50 miles. Its area is 8224 square miles, of which 7514 square miles are land surface. Only three other States, Rhode Island, Delaware, and Connecticut, have a smaller area.

Topography. The northern and southern divisions of the Atlantic slope meet in New Jersey. The former division is characterized by the absence of the coastal plain and by the less definite demarcation of the piedmont plain (q.v.). The latter division is characterized by the well-defined presence of both. The State is crossed in the northwest by the easternmost ranges of the Appalachian system. Running across the State in roughly parallel bands from northeast to southwest, are four distinctly marked topographic provinces determined by the geological formations. (See paragraph *Geology*.) The first, beginning at the northwest, is the Kittatinny Range and upland valley. This range, owing to the resistant character of the conglomerate rock, is a continuation of the Blue Mountains of Pennsylvania. It runs in a nearly continuous ridge into New York, reaching in High Knob, near the boundary, a height of 1799 feet. The Kittatinny valley is 40 miles long and from 10 to 13 miles wide and is an excellent agricultural region. The second province includes the Highlands, a continuation of the Berkshire Hills of Massachusetts and the Highlands of New York. This is a region of rounded and forested hills with intervening cultivated valleys. It is a region of limited agriculture and population, but superb natural scenery. The province is about 15 miles in width, and the highest elevations, marking the level of the ancient peneplain, reach 1500 feet above the sea. The third province, the piedmont plain, is nearly as wide as the first two combined and constitutes one-fifth of the area of the State. It ranges in elevation from the sea level in the marshes of the Hackensack valley in the east to over 500 feet in the west. It is a rolling plain, diversified by bold trap-rock ridges extending in a northeast and southwest direction, such as the Palisades along the Hudson and the First and Second Mountains. The fourth province is a portion of the Atlantic coastal plain and includes the entire southern half of the State south of a line running from Trenton to Newark Bay. It is a gently undulating plain, one-third of which is less than 50 feet above sea level and nowhere more than 400 feet above sea level. Drained by sluggish rivers, it is bordered on the coasts by salt marshes, locally called meadows, fringed by shallow coast lagoons inclosed by outlying sand beaches, such as that upon which Atlantic City is built.

Drainage. The narrow west slope drains to the Delaware River, but by far the greater portion drains directly into the Atlantic Ocean or its inlets. The principal rivers are the Passaic and Hackensack, flowing into Newark Bay; the Raritan, flowing into Raritan Bay; the Mullica and Great Egg, emptying into the Atlantic lagoons; and the Maurice, into Delaware Bay. Lakes are confined chiefly to the glaciated north-


NEW JERSEY
SCALE OF STATUTE MILES
0 5 10 15 20 25 30
SCALE OF KILOMETERS
0 5 10 20 30 40 50
County Towns
Railroads
A
B
C
D
E
1
2
3
75°
75 30
74°
74 30'
41°
40 30
NEW YORK
CONN.
PENNSYLVANIA
LONG ISLAND SOUND
LONG ISLAND
OCEAN
Hudson R.
Delaware
Lehigh
Schuylkill
Lower New York Bay
Sandy Hook
TRENTON
Newark
Jersey City
Hoboken
Paterson
Elizabeth
New Brunswick
Perth Amboy
Long Branch
Phillipsburg
Morristown
Lambertville
Flemington
Somerville
Easton
Allentown
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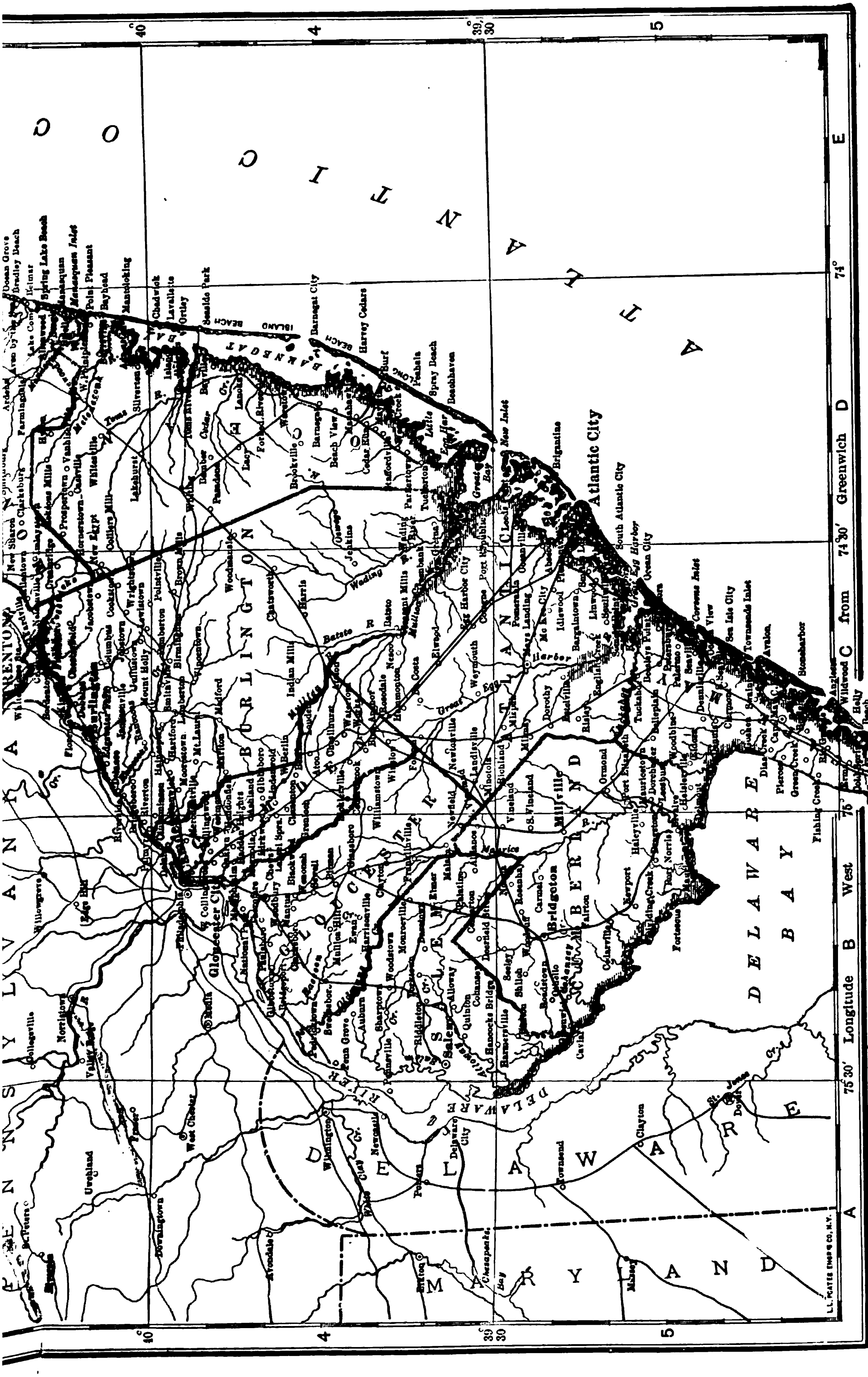
ATLANTIC OCEAN
DELAWARE BAY
PENNSYLVANIA
DELAWARE
MARYLAND
BURLINGTON
OCEAN
GLOUCESTER
SALEM
CUMBERLAND
ATLANTIC
CAPE MAY
TRENTON
Atlantic City
Gloucester City
Bridgeton
Millville
Salem
Vineland
Camden
Philadelphia
Wilmington
Cape May
Cape May Point
DELAWARE RIVER
BARNEGAT BAY
ISLAND BEACH
LONG BEACH
Great Bay
Egg Harbor City
A
B
C
D
E
Longitude West from Greenwich
75° 30'
75°
74° 30'
74°
40°
39° 30'
4
5
L.L. POATES ENGR CO. N.Y.

ern section. There are several beautiful glacial lakes in the Highlands, the largest being Lake Hopatcong and Greenwood Lake, the latter lying partly in New York State. Noted natural features are the Falls of the Passaic River at Paterson, the Palisades of the Hudson, and the Delaware Water Gap, where the Delaware River has cut a notch 1200 feet deep in the Kittatinny Range.

Climate. In spite of the fact that New Jersey is a seaboard State, its climate is continental. With the exception of a narrow coastal strip, the winds come from the western quarter three times as much as from the eastern. Since the extreme northern portion is also the most elevated and the extreme southern portion is low and surrounded by water, the slight range in temperature due to difference in latitude is accentuated, so that there is an extreme variation of 8 degrees between the mean annual temperature of the north and the south. The former is 46° F. and the latter 54° F. The mean annual rainfall is, in general, between 42 and 51 inches, the highest being in the northwestern highlands. Fruit trees blossom three weeks earlier in the southern counties than in the northern.

Soils. The soils of the coastal plain, except in the Cretaceous strip at its inner edge, are predominantly sands and sandy loams, and upon the terraces along the Delaware River and Bay sandy and silt loams prevail with occasional areas of plastic clay. The Piedmont section consists of loam and clay soils often of a deep-red color. The highlands of the north have been glaciated, while the section adjoining the Piedmont contains residual soils of similar nature to those of the western Piedmont in the southern States.

For flora and fauna, see paragraph under UNITED STATES.

Geology. The geology of New Jersey finds expression in its topography. Beginning at the northwest, we find the Kittatinny Mountain and valley, consisting of beds of Paleozoic shale, limestone, and sandstone, formerly folded, later base-leveled, and now tilted at a high angle. The Highlands consist mainly of pre-Cambrian gneiss and granite; they are a part of the oldest land in North America. The piedmont plain is also called the red sandstone plain, as it consists mainly of the Triassic red sandstone and shale with scattered intrusions of trap rock belonging to the Newark group. In the coastal plain the surface deposits consist wholly of unindurated materials of great depth. Running from Staten Island Sound southwest to Camden is a fertile belt composed of Cretaceous marls, sands, and clays, while the entire remaining portion is covered with Tertiary clays and sands, a considerable part of which are sterile and are covered with pine forests. The northern third of the State is covered with the glacial deposits of the last Ice age.

Mineral Production. New Jersey owes its importance as a mineral producer largely to the utilization of its clay resources. Clay products, valued in 1913 at $19,705,378, represent over 50 per cent of the total mineral output and include every variety of brick and tile and of pottery produced in the United States. The State ranks third in value, and second only to Pennsylvania in variety, of clay products. It is second in value of pottery products and fourth in the value of brick and tile produced. Mercer County, which includes Trenton, the centre of the pottery industry, is the most important clay-working county, the leading product being sanitary ware. Middlesex County is the principal producer of common brick, architectural terra cotta, fireproofing, tile, and fire brick. Zinc is the mineral product second in importance. The chief zinc-producing district is the famous Franklin Furnace region in Sussex County, embracing the great zinc deposits of Sterling Hill and Mine Hill. The former was mined continuously from about 1875 to 1900, and the latter in 1912 made almost its maximum yield after 60 years of active mining. The recoverable zinc content of the ore produced in New Jersey in 1913 was 84,122 short tons, valued at $9,421,664. In that year New Jersey was second only to Missouri as a producer of this mineral. Third among the mining industries in importance is the manufacture of Portland cement. The production in 1913 was 4,255,015 barrels, valued at $3,638,755. The principal quarry product of New Jersey is trap rock, which is used mainly for road making and concrete. The total value of all stone quarried in New Jersey in 1913 was $1,772,832. The State is one of the leading producers of molding sand, and the output in 1913 amounted to 503,648 short tons, valued at $285,677. The output of iron ore amounted to 291,653 long tons, valued at $980,303.

Agriculture. Of an approximate land area of 4,808,960 acres, 2,573,857 were under use as farms in 1910. The percentage of land area to farms was generally greater in the western counties. The total number of farms in 1910 was 33,487, and the average acres per farm 76.9; the improved land in farms, 1,803,336 acres; the value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, $254,832,665. Of the total number of farms in 1910, 25,193 were operated by owners and managers and 8294 by tenants. A little over two-thirds of the farms were between 20 and 174 acres in size. The native white farmers numbered 26,796; the foreign-born white farmers 6215; and the negro and other nonwhites 476. Of the foreign-born white farmers, 2002 were born in Germany. The following table gives the acreage, production, and value of the important crops in 1914, as estimated by the United States Department of Agriculture:

CROPS	Acreage	Prod. bush.	Value
Corn	272,000	10,472,000	$7,959,000
Wheat	79,000	1,422,000	1,550,000
Oats	67,000	1,943,000	1,049,000
Rye	70,000	1,295,000	1,062,000
Buckwheat	10,000	210,000	174,000
Potatoes	92,000	9,936,000	1,061,000
Sweet potatoes	22,000	2,200,000	2,090,000
Hay	361,000	*487,000	9,496,000

* Tons.

The total value of the crops in 1909 was $40,340,000, and the combined acreage 1,114,903. It must be noted that several crops mentioned below are more important than some of those included in the table. Census figures for 1909 show in hay and forage an acreage of 401,315 and a production of 569,442 tons, valued at $7,627,402; in corn an acreage of 265,441 and a production of 10,000,731 bushels, valued at $6,664,162; in wheat an acreage of 83,637 and a production of 1,489,233 bushels, valued at $1,568,880; in oats an acreage of 72,130 and a production of 1,376,752 bushels, valued at $712,609; in rye an acreage of 69,032 with a production of 951,271 bushels, valued at $707,250; in buckwheat an acreage of 13,155 and a production of 212,548 bushels, valued at $141,997. In 1909 the total acreage of potatoes and other vegetables was 181,722 and their value $14,073,467. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 86,227 and their value $7,566,000. The apple crop in 1909 was 1,406,778 bushels, valued at $956,108; peaches and nectarines, 441,440 bushels, valued at $652,771; pears, 463,290 bushels, valued at $254,582. Other fruits grown are cherries, quinces, and plums and prunes. The total production of orchard fruits in 1909 was 2,372,358 bushels, valued at $1,975,044. There were produced also 6,501,221 pounds of grapes, valued at $132,957. Of small fruits, chiefly strawberries and cranberries, there were raised in the same year 38,822,987 quarts, valued at $1,954,125. New Jersey is one of the most important States in the production of flowers and plants, the value of these products in 1909 being $2,839,319.

Live Stock and Dairy Products. The total value of live stock on farms in 1909 was $22,325,469. On Jan. 1, 1915, according to the estimates of the United States Department of Agriculture, there were, on the farms, cattle other than milch cows, 70,000, valued at $12,205,000; milch cows, 146,000, valued at $9,928,000; horses, 92,000, valued at $13,432,000; mules, 4000, valued at $676,000; sheep, 31,000, valued at $186,000; swine, 161,000, valued at $2,254,000. The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $10,156,000. The milk sold amounted to 56,856,550 gallons, valued at $8,937,246, and the butter made to 3,622,411 pounds, valued at $1,059,935. The total number of fowls of all kinds on farms in 1910 was 2,597,448, valued at $2,221,610.

Fisheries. Bounded, as it is for many miles, by the Delaware and Hudson rivers and Delaware Bay, New Jersey, with its long stretch of well-indented seacoast and with its proximity to the chief markets, is well adapted to the fishing industry. Its total production in 1908, valued at $3,069,000, placed it eighth among the States. The men engaged in this industry in that year numbered 7231, and the capital invested amounted to $1,714,000. Most important of these products were oysters, the gross output of which, representing 45 per cent of the total value of all fishery products, was 2,586,000 bushels, valued at $1,369,000; some of the other more important products with value of catch in 1908: squeteague, $342,000; clams, $337,000; shad, $229,000; cod, $130,000; sea bass, $123,000; bluefish, $99,000. In value of products the industry is almost evenly divided between vessel fisheries and shore and small-boat fisheries.

Manufactures. Owing largely to its exceptionally favorable geographic position and its splendid transportation facilities, New Jersey is one of the most important manufacturing States. It is in close proximity to the anthracite-coal fields of Pennsylvania and to the markets of New York City and Philadelphia. The manufacturing centres are either located on New York harbor or connected therewith by water or by rail. The gross value of products per capita was $451 in 1909, and in 1914 it was $562 (State est.). In 1909 New Jersey held sixth place among the States in gross value of such products. The table below gives the most important figures relative to manufactures in 1909 and 1904.

The most important single industry measured by value of product is the smelting and refining of copper. In this industry, here confined chiefly to the refining of crude copper, New Jersey ranked first among the States in 1909. The most important group of industries is the one engaged in the manufacture of textiles. These combined industries in 1909 gave employment to an average of 60,647 wage earners and yielded a product valued at $133,205,000. The manufacture of silk and silken goods, the manufacture of all woolen goods, and the manufacture of cotton goods are the three chief industries of this group. The number of producing spindles in the first two industries in 1909 was 910,724. There were 37,287 looms, of which 28,915 were silk looms. In that year the raw silk consumed amounted to 6,112,647 pounds. Thread is the most important product of the cotton mill. The raw cotton consumed amounted to 18,400,527 pounds. Third in point of value is the manufacture of foundry and machine-shop products. The slaughtering and meat-packing industry is confined largely to the northern section of the State. New Jersey ranks first also in the production of copper wire. Other important industries not mentioned in the table are shipbuilding, including boatbuilding, manufactures of precious metals, the manufacture of soap, paint and varnish, pottery, terra cotta, and fire-clay products, glass, and oilcloth and linoleum. The chief details in regard to the manufacture of clay products are given in the section on *Mineral Production* above. In the manufacture of oilcloth and linoleum New Jersey leads all other States.

The average number of wage earners in 1909 was 326,223, of whom 240,273 were males. Of 7538 wage earners under 16 years 3774 were males. The greater number of women employed were in the textile industries, over one-half of the employees in each of these industries being women 16 years of age and over. For the great majority of wage earners employed the usual hours of labor range from 54 to 60 a week. Thirty-two incorporated places, with a population of 10,000 or over, contained 76.3 per cent of the average number of wage earners and produced 74.3 per cent of the total value of products. Newark is the largest and most important city. There were in this city in 1909 59,955 wage earners, and the value of the manufactured product was $202,511,520. In the value of manufactured products it stood eleventh among the cities of the United States. The leading industries are the smelting and refining of copper, the manufacture of leather, foundry and machine-shop products, jewelry, and malt liquors. There were in Jersey City, the second city in size, 25,454 wage earners, and the value of its products was $128,774,978. Among the leading industries here are the slaughtering and packing of meat, tobacco manufacture, the manufacture of foundry and machine-shop products, the manufacturing of soap, the refining of sugar, and the refining of petroleum. Bayonne, although it had in 1909 only 7519 wage earners, put out products valued at $73,640,900. Perth Amboy employed 5866 wage earners and produced an output valued at $73,092,703. Paterson outranked all others in the United States in the manufacture of silk and silken goods, giving employment to 32,004 wage earners, and manufacturing products valued at $69,584,351. Other cities whose manufactures exceeded $10,000,000 in value are Camden, Trenton, Passaic, Elizabeth, Hoboken, Harrison, and New Brunswick. Further details in regard to the manufactures of these cities will be found under their separate titles.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — FIFTEEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	8,817	371,265	326,223	$977,172	$169,710	$1,145,529	$425,496
	1904	7,010	296,262	266,336	715,060	128,169	774,369	303,920
Bread and other bakery products	1909	1,217	6,966	4,936	8,100	3,309	20,086	7,891
	1904	1,000	5,237	3,848	5,406	2,312	13,502	5,298
Chemicals	1909	50	5,937	5,046	24,355	2,895	22,824	10,567
	1904	47	4,048	3,597	16,294	1,853	13,024	6,394
Cotton goods, including cotton small wares.	1909	26	6,894	6,638	17,824	2,577	13,729	5,164
	1904	17	5,501	5,362	14,290	2,022	8,579	3,436
Dyeing and finishing textiles	1909	67	10,722	10,129	23,315	5,016	15,796	9,443
	1904	57	8,180	7,597	13,069	3,466	11,980	6,928
Electrical machinery, apparatus and supplies.	1909	69	13,024	11,099	30,229	5,615	28,365	13,939
	1904	42	7.291	6,268	18,458	2,894	13,803	6,930
Foundry and machine-shop products	1909	591	32,076	27,815	87,023	16,922	65,398	35,458
	1904	502	29,111	26,038	64,330	14,765	50,553	29,743
Leather, tanned, curried, and finished	1909	86	6,040	5,560	18,847	3,473	28,431	8,233
	1904	73	5,358	4,953	12,492	2,793	21,495	6,223
Liquors, malt	1909	33	2,634	2,125	40,535	1,836	20,184	15,303
	1904	37	2,443	1,958	30,336	1,681	17,446	13,585
Rubber goods, not elsewhere specified	1909	36	4,860	4,255	15,766	2,300	19,543	6,511
	1904	24	1,919	1,728	3,788	846	4,836	1,877
Silk and silk goods, including throwsters.	1909	348	32,365	30,285	43,615	13,917	65,430	32,165
	1904	239	26,986	25,481	33,645	9,893	42,863	20,524
Slaughtering and meat packing	1909	84	2,420	1,817	8,182	1,286	37,583	3,843
	1904	48	918	745	2,593	488	17,754	1,683
Smelting and refining, copper	1909	4	2,564	2,322	29,078	1,335	125,651	6,715
	1904	5	1,345	1,243	7,893	645	62,796	3,984
Tobacco manufactures	1909	462	10,610	9,466	21,164	3,156	24,177	13,381
	1904	554	7,356	6,508	20,522	2,041	10,988	7,180
Wire	1909	7	6,255	5,646	21,829	2,767	28,858	6,560
	1904	4	678	619	2,047	316	11,104	1,215
Woolen, worsted, and felt goods, and wool hats.	1909	33	13,119	12,652	36,391	4,964	33,939	12,906
	1904	35	9,301	8,983	18,979	2,951	16,394	5,766

Transportation. Because of the geographical location of the State, railroads approaching New York from the west, or Philadelphia from the east, necessarily traverse New Jersey. The total railroad mileage on Dec. 31, 1913, was 2443. The principal systems with their mileage follow: Pennsylvania, 763; Central Railroad of New Jersey, 443; Philadelphia and Reading, 223; Erie, 160; Delaware, Lackawanna, and Western, 235; New York, Susquehanna, and Western, 127; Lehigh Valley, 123; New York Central and Hudson River, 26. In addition to the railroad mileage, New Jersey has two important canals. The Delaware and Raritan, now controlled by the Pennsylvania Railroad, is, with its feeder, 66 miles long. The Morris Canal, now owned by the Lehigh Valley Railroad System, is, with its feeders, 109 miles long. The State, bounded on three sides by navigable waters, has also large natural water transportation facilities.

Banks. In 1804 two banking companies were chartered by the Legislature, one to do business in Newark and the other in Trenton. A general banking law was passed in 1812 for the protection of depositors. This law remained in force till 1850. Reports were made obligatory, the total indebtedness and the rate of discount were limited. But the provisions of the law were avoided, and a number of speculating banks flooded the State with worthless paper. This condition of affairs and the suspension of specie payment in 1837 led to a reform in 1850. Another general banking law was passed. Under this statute the bank circulation had to be guaranteed by deposits of collateral security—bonds of States, etc. The limits of loans on real estate were strictly set and investigations of the banks made possible. In 1860 there were eight banks of issue. Besides these, there were a number of specially incorporated banks of discount and deposit. In 1859 the number was 36, but most of them availed themselves of the national banking law, and there were only five left in 1870.

In 1868 there were 55 national banks, and in 1900, 115. A Department of Banks and Insurance was established in 1891. The banking law was revised in 1899. Trust companies have rapidly multiplied since 1880, under the influence of the organization of gigantic corporations, which have made the State conspicuous. In 10 years the number of these increased from 11 to 23, and the deposits increased eightfold. Savings banks were established early (1828); a law for regulating them was passed in 1876, and it remains almost unchanged. On Sept. 12, 1914, there were 202 national banks with an aggregate capital of $22,302,000; a surplus of $23,143,250; cash, $3,422,007; deposits, $207,523,000. On June 30, 1914, there were 24 State banks with an aggregate capital of $2,123,750; a surplus of $1,678,390; cash, $964,548; deposits, $18,305,797; 27 savings banks with 336,600 depositors and $130,653,652 deposits; 10 private banks with aggregate resources of $1,317,987 and total individual deposits of $490,564; 103 loan and trust companies with a capital of $19,417,300 and total deposits of $226,049,381.

Government. The constitution of the State was adopted in 1844 and amended in 1875 and in 1897. An amendment may originate either in the Senate or in the General Assembly, but in order to become effective must be adopted by two successive Legislatures and finally by the people in special election.

Executive.—The supreme executive officer is the Governor, to be eligible to which office the candidate must have attained the age of 30 years and have been for 20 years a citizen of the United States, and for seven years prior to his election a resident of New Jersey. The Governor is elected for a term of three years, and may not be chosen to succeed himself. It is his prerogative, subject to the approval of the Senate, to appoint the Attorney-General, prosecutors of pleas, clerk of the supreme court, clerk of the court of chancery, Secretary of State, judges of the various courts, and many commissions. During the last week of his term of office, however, he is forbidden to make any appointments or nominations to office. The State Treasurer and the Comptroller, two other important executive officers, are appointed for terms of three years by Senate and General Assembly in joint meeting.

Legislative.—The Legislature, consisting of a Senate and General Assembly, meets annually. The Senate is composed of one member from each county. The Senators are elected for a term of three years, and by a special constitutional arrangement about one-third of them are elected each year. Members of the General Assembly are apportioned among the counties in proportion to population, and are elected for terms of one year. The Legislature of 1915 was composed of 21 Senators and 60 members of the General Assembly.

Judiciary.—The judicial system is unusually complicated. A court of errors and appeals is the highest court and the court of last resort. It is composed of the chancellor, the justices of the supreme court, and six additional judges appointed for six years. There is a court for the trial of impeachments, a court of chancery, composed of the chancellor and eight vice chancellors appointed for seven years, a prerogative court, a supreme court, composed of the Chief Justice and eight associates appointed for terms of seven years, a circuit court, and inferior courts. There are nine judicial districts, and circuit courts are held by each supreme-court judge in each county of the district. The Governor, with the advice and consent of the Senate, appoints the judges of the court of common pleas. The prerogative court has charge of appeals from the orphans' court, and has authority to grant probate of wills and letters of administration and guardianship.

Suffrage and Elections.—Every male citizen of the United States of the age of 21 years, who has been a resident of the State for one year and of the county in which he claims his vote five months previous to the election, is entitled to vote. General elections are held annually on the Tuesday next after the first Monday in November. General primary elections are held on the fourth Tuesday in September. A measure passed in 1911, known as the Geran Bill, widely extended the application of the direct primary law, provided the Massachusetts ballot, and contained provisions which aimed to prevent fraud at elections. Members of the election boards who have charge in each district of the registering and polling of voters must be selected from party members who have passed the civil-service examination. Provision is made for presidential primaries and for the election of delegates to national party conventions. Each candidate for the nomination for the office of State Senator or member of the General Assembly must file with his nominating petition a statement whether he will or will not vote for the candidate for United States Senator who is nominated by his party at the primaries. All officials, including the Governor and Congressmen, must be selected by direct primaries. There are severe penalties for bribery and other forms of corruption. The expenditures of candidates are limited by law.

Local and Municipal Government.—The State is divided into counties, cities, townships, and boroughs. Townships having a population of 5000 may be incorporated as towns, and those with an area of less than 4 square miles and a population of less than 5000 may be incorporated as boroughs. Cities and towns may adopt a commission form of government. The government of townships is vested in an annual town meeting. In the counties clerks and surrogates are elected by the people, and at the annual meetings of townships and of city wards sheriffs, coroners, and justices of the peace are elected.

Miscellaneous Statutory Provisions.—Children under 16 years of age are forbidden to work in mercantile establishments more than 48 hours a week. There is a public-utility commission and a commission of old-age insurance and pensions. Corporations may not acquire stocks or securities from other corporations, except for investment purposes. There is an employers' liability law and an eight-hour law for laborers on public works. The formation of trusts was regulated in 1913 by the passage of seven radical measures. (For discussion of these, see TRUSTS.) There are strong laws for the regulation of the liquor traffic.

Finances. The beginning of the Civil War found the State in a satisfactory financial condition. It became involved in heavy war expenses, and a loan of $2,000,000 and a State tax of $100,000 for war purposes were authorized in 1861. In 1866 the total war debt amounted to $3,305,200. Besides, the minor civil divisions of the

State (counties and towns) spent more than $23,000,000 for war purposes. This debt was totally extinguished by the redemption of the last $71,000 on Jan. 1, 1902.

In the matter of taxation New Jersey is in advance of many States, having long ago solved the problem of conflict between State and local taxation by entirely dividing these two fields. Even between 1840 and 1850 the income was largely derived from taxes on the gross receipts of railroads ("transit duties" was their official designation), taxes on capital stock of railroads, etc. A State tax upon general property was only introduced in 1861 for war purposes, and, though it existed for 20 years, it was exceedingly small. In 1880, 75 per cent of the income was derived from corporation taxes. New laws for taxation of railroads as well as other corporations were passed in 1884 and 1885, and were declared constitutional after a hard struggle. Since then the only State tax on general property is collected for the purposes of the school fund. The whole sum collected is returned to the towns. This is therefore a State tax in form only.

The income of the State government is derived from taxes on railroads (20 to 25 per cent) and other corporations (55 per cent) and from fees, licenses, etc. Since 1890 taxes on new corporations, of which so many have been formed in New Jersey, have constituted a large share of the receipts. At the beginning of the fiscal year ending Oct. 31, 1914, there was a balance on hand of $1,727,992. The total receipts during the year were $9,056,340 and the disbursements $9,678,727, leaving a balance on hand of $1,085,605.

Militia. The males of militia age in 1910 numbered 597,513. The strength of the organized militia on Dec. 31, 1913, was 4014 enlisted men and 304 officers. The militia includes one brigade of infantry, comprising three regiments; two unattached regiments of infantry; a squadron of cavalry; two batteries of field artillery; a signal corps company; and a company of sanitary troops with a field hospital.

Population. In 1910 New Jersey ranked eleventh among the States in population. The population at each Federal census was as follows: 1790, 184,139; 1800, 211,149; 1810, 245,562; 1820, 277,575; 1830, 320,823; 1840, 373,306; 1850, 489,955; 1860, 672,035; 1870, 906,096; 1880, 1,131,116; 1890, 1,444,933; 1900, 1,883,669; 1910, 2,537,167. In 1910 the average number of people per square mile was 337.7; the urban population (in cities of 2500 or over), 1,907,210, and the rural, 629,957. The native whites of native parentage numbered 1,009,909; native whites of foreign or mixed parentage, 777,797; foreign-born whites, 658,188; and negroes, 89,760. About 63 per cent of the foreign-born population come from Germany, Italy, Russia, and Ireland, named in order of their importance. By sex the population was divided into 1,286,463 males and 1,250,704 females. Males of militia age (between 18 and 44 years) numbered 597,513; those of voting age, 774,702. In 1910 there were nine cities with a population of over 50,000. These cities with their populations for 1910 and 1914 (estimated) are as follows: Newark, 347,469, 389,106; Jersey City, 267,779, 293,921; Paterson, 125,600, 134,305; Trenton, 96,815, 106,831; Camden, 94,538, 102,465; Elizabeth City, 73,409, 82,411; Hoboken, 70,324, 74,994; Bayonne, 55,545, 65,271; Passaic, 54,773, 66,276.

Education. Education received early attention in New Jersey. The first school founded was at Bergen in 1661. During the Colonial period schools were maintained chiefly by churches. There were, however, a few schools maintained by towns, and at a little later period private schools were organized. In 1693 the first school law was enacted by the General Assembly of East New Jersey at Perth Amboy. This law was a complete recognition of the principle of taxing property for the support of the public schools. The settlement of Quakers gave an additional impetus to educational matters. Several academies were established even before the founding of Princeton College in 1746. There had been founded several schools which gave education in the classics. In 1867 a public-school fund was established, and at the same time townships were required to levy taxes for the maintenance of schools. The main features of the present school system are contained in the law passed in 1867, although it was not till 1871 that a State school tax was imposed and schools were made free to all children. The township school district was established in 1894, and the school laws have been revised by different Legislatures, especially in 1903, when all cities were placed under one general law. Educational affairs are administered by a State Board of Education consisting of eight members appointed by the Governor, a Commissioner of Education and four assistant commissioners, together with county superintendents and district superintendents.

There were, in 1910, 113,502 illiterates, or 5.6 per cent of the total population. Among native whites of native parentage the percentage of illiteracy was 1.1; among native whites of foreign or mixed parentage 0.7; and among foreign-born whites 14.10. The percentage of illiteracy among the negroes in 1910 was 9.9. The total school population in the same year was 708,525; of these, 440,913 attended school. The total enrollment in the day schools on June 30, 1914, was 496,899. Of these, 250,705 were boys and 246,194 girls. The average daily attendance was 382,218. There were enrolled in evening schools 40,412 pupils, and in private schools 67,759 pupils. The total number of teachers was 15,085, of whom 13,003 were females and 2082 males. The average yearly salary for male teachers of rural schools varied from $719.37 to $788.48, and for female teachers from $520.25 to $645.28. There were 2124 school buildings, and the total value of school property was $57,670,223. On June 30, 1914, there were 153 approved high schools; in these were enrolled 38,099 pupils. One assistant commissioner of education has charge of industrial work, including agriculture in the schools of the State. The Legislature of 1913 passed a vocational-schools law which provides for the organization of vocational schools in any district and for a union of two or more districts. Such schools have been organized in Atlantic City, Bayonne, Jersey City, Newark, Paterson, and Passaic. County vocational schools have been organized in the following counties: Atlantic, Essex, Middlesex, and Cape May.

Provision is made for the education of subnormal children, and over 120 classes for the instruction of such children have been formed. There was expended for educational purposes, in 1913–14, $25,783,914. Of this, $11,415,629 was for teachers' salaries. There is a compulsory-attendance law, which has been revised several times. The public schools are supported by an income from the State school fund, from appropriations from the general funds of the State and from the State railroad tax, by the State school tax, and by local appropriations. The State school fund is derived chiefly from the sale and lease of lands under water belonging to the State. There are normal schools at Trenton, Montclair, and Newark. Special schools are the New Jersey School for the Deaf at Trenton, Manual Training and Industrial School for Colored Youth at Bordentown, School of Industrial Arts at Trenton, Hoboken Industrial School, and Newark Technical School. Institutions of collegiate rank are Princeton University at Princeton, Stevens Institute of Technology at Hoboken, Rutgers College at New Brunswick, Upsala College at Kenilworth (coeducational), St. Peter's College at Jersey City, Seton Hall College at South Orange, College of Mount St. Mary at Plainfield, and College of St. Elizabeth at Convent. The four last named are Roman Catholic institutions. The Presbyterian Theological Seminary is at Princeton, the Drew Theological Seminary (Methodist Episcopal) at Madison, the German Theological School at Bloomfield, and the Theological Seminary of the Dutch Reformed Church in America at New Brunswick. There are many private secondary schools.

Charities and Corrections. The charitable and correctional institutions include State hospitals for the insane at Morris Plains and Trenton, the State Home for the Feeble-Minded at Vineland, the New Jersey State Home for Epileptics at Skillman, soldiers' homes at Kearny and Vineland, a sanatorium for tuberculous diseases at Glen Gardner, a State home for boys at Jamesburg and for girls in Ewing, a State reformatory for criminals near Rahway, and a State prison at Trenton. In these institutions there were, in 1914, 17,706 inmates. Institutions of the first class may maintain detention homes for juveniles. Prison contract labor in the State is prohibited. Counties of the first class may establish parental schools and juvenile courts. The State allows $200 a year to any blind person who wishes to take a course in a higher educational institution in the State.

Religion. Roman Catholics form over 20 per cent of the total population of New Jersey. Members of all Protestant bodies combined are slightly less numerous than the Roman Catholics. The most important Protestant denominations, in order of their numerical strength, are the Methodist, Presbyterian, Baptist, Episcopal, and Dutch Reformed church.

History. The territory included within the limits of the present State was claimed by the Dutch without any definite boundaries as a part of New Netherland, and between 1614 and 1621 settlements were made in what is now Hudson County. Swedes and Danes also settled on the Delaware River, but were brought under the jurisdiction of the Dutch by Governor Stuyvesant. In 1664 this whole region was granted to James, Duke of York, by Charles II, but before James took possession he conveyed to John, Lord Berkeley, and Sir George Carteret the land between the Delaware and Hudson rivers, bounded on the north by a line drawn from 41° 21′ on the Delaware River to 41° on the Hudson, the present boundaries. In 1664–65 Berkeley and Carteret granted a form of government and settlement, the Concessions, which allowed a popular assembly, and under which the Colony was governed until the Revolution. Philip Carteret was sent over as Governor in 1665, and made Elizabeth Town his capital. On March 18, 1674, Berkeley sold his interest to John Fenwick, in trust for Edward Byllinge, both Quakers, for £1000, and in 1676 the province was divided by a line drawn from Little Egg Harbor to the northwest corner. The Quakers took the western half, known as West New Jersey, while Carteret retained East New Jersey. Soon Byllinge surrendered his title to William Penn and others as trustees for his creditors, and West Jersey was divided into 100 shares, of which Fenwick retained 10. Each of these shares carried with it the same rights of sovereignty as had been granted to the Duke of York. When the question was raised as to whether the Duke of York, not being a sovereign, could transfer the rights of government, Sir Edmund Andros, then Governor of New York, arrested Philip Carteret and Fenwick and attempted to assume control. He was forced to give way in 1681, however, and the Colonies continued to be governed by the proprietors. In 1682 Carteret's heirs sold East Jersey to William Penn and his associates. The proprietors of both Colonies in 1702 ceded their right of government to the crown, and the Colonies were united and placed under the Governor of New York, though New Jersey retained its separate Assembly. There was freedom of worship, but political privileges were withheld from Roman Catholics, and even as regards others the possession of at least 200 acres of land or of property valued at £50 was a necessary qualification for the suffrage. In 1738 the province received a separate Governor. Manufacturing began very early. A paper mill was established at Elizabeth in 1728, and, in 1769, 40 of these were in operation. By 1750 the population was about 80,000. A glass factory was begun in 1748. In 1791 the Society for the Encouragement of Useful Manufactures was chartered, with the exclusive right of utilizing the falls of the Passaic, and the town of Paterson was founded. The first Provincial Congress met at New Brunswick, July 21, 1774. In 1776 the Royal Governor, William Franklin, was deposed, and on July 2, 1776, the Provincial Congress adopted a constitution for the Colony of New Jersey without submitting it to the people. Under this instrument the Governor was to be chosen annually, and was to be executive, President of the Council, and chancellor, thus combining executive, legislative, and judicial functions. On July 18 the Provincial Congress ratified the national Declaration of Independence and changed the title of the Colony to that of State of New Jersey. During the Revolution the State did its full duty and was the scene of many of the battles of the war. (For military operations during the War of the Revolution, see UNITED STATES.) The State hesitated to enter a Federal union out of fear of the larger States. In the constitutional convention of 1787 William Paterson (q.v.), one of her delegates, proposed the famous New Jersey Plan, which provided for a single legislative House, in which each State should have one vote. The State ratified the constitution, Dec. 18, 1787. The capital was fixed at Trenton in 1790, and the history of New Jersey for many years after that was one of increasing prosperity. In 1844 a new constitution was adopted, providing for a term of three years for the Governor and taking away his judicial duties. In 1875 the constitution was thoroughly revised. The word "white" was struck from the suffrage clause, though, of course, it had been a dead letter since the adoption of the Fifteenth Amendment to the United States Constitution. Politically, the State has generally inclined towards the Democratic party. In 1796, 1800, and 1812 it supported the Federalist candidates; from 1836 to 1848 it was Whig; in 1860 it gave four votes to Lincoln and three to Douglas; in 1872 it cast its vote for Grant; and in 1896 and 1900 it went Republican on the money question. The large corporations, including the great railroads crossing the State, for many years controlled the Legislature. A strong and successful attempt to break their political power began about 1906–07. The reform movement affected both parties and came to be known as the New Idea. In 1907 the reformers were strong enough to defeat John F. Dryden for the United States Senate, Frank O. Briggs, a compromise candidate, being elected. Candidates of both great parties for Governor in the same year were pledged to enforce the laws against corporations. J. Franklin Fort, Republican, was elected. A new primary-election law passed in 1907 became effective in 1908. In the presidential election in November, 1908, Taft received 265,298 votes and Bryan 182,522. In 1910 the Democratic party had gained such strength that its voters, hoping with a strong candidate to elect its Governor, chose Woodrow Wilson, the president of Princeton University. The Republicans nominated Vivian M. Lewis. In the campaign which followed Mr. Wilson at once attracted the attention of the country by a series of forceful addresses and was elected. He received 233,682 votes, compared with 184,626 cast for Mr. Lewis. The Democrats also elected a majority of the Legislature. James E. Martine, Democrat, was elected to the United States Senate by the Legislature in January, 1911. The administration of Governor Wilson was notable. Largely through his efforts the Legislature passed a number of important measures designed to remedy political conditions. In 1911 the primary-election law was radically amended. (See *Government* above). Governor Wilson carried the State by a large majority. In the presidential election held in 1912 Wilson received 178,289 votes; Roosevelt, 145,410; and Taft, 88,835. A Democratic Legislature was elected, which in January, 1913, elected William Hughes United States Senator. Governor Wilson continued to hold office until March 1, 1913, when he was succeeded by John F. Fielder, President of the Senate. The Legislature of 1913 passed measures strongly advocated by President Wilson intended to reform the methods of selecting juries. At the primaries in 1913 acting Governor Fielder was elected by the voters, with a Democratic Legislature. In 1914 the Republicans elected a majority in the Legislature for the first time since 1910. The following is a list of the Colonial and State Governors of New Jersey:

GOVERNORS OF EAST AND WEST JERSEY AFTER THE UNION

Edward, Lord Cornbury*	1702–08
John, Lord Lovelace*	1708–09
Robert Hunter*	1710–19
William Burnet*	1720–28
John Montgomerie*	1728–31
Lewis Morris (President of the Council)	1731–32
William Cosby*	1732–36
John Anderson (President of the Council)	1736
John Hamilton (President of the Council)	1736–38

* Also Governors of New York.

GOVERNORS OF NEW JERSEY ONLY

Lewis Morris	1738–46
John Hamilton (President of the Council)	1746
John Reading (President of the Council)	1746–47
Jonathan Belcher	1747–57
John Reading (President of the Council)	1757–58
Francis Bernard	1758–60
Thomas Boone	1760–61
Josiah Hardy	1761–62
William Franklin	1762–76

GOVERNORS OF THE STATE

William Livingston	Federalist	1776–90
William Paterson	“	1790–93
Richard Howell	“	1793–1801
Joseph Bloomfield	Democratic-Republican	1801–02
John Lambert (acting)	“ “	1802–03
Joseph Bloomfield	“ “	1803–12
Aaron Ogden	Federalist	1812–13
William S. Pennington	Democratic-Republican	1813–15
Mahlon Dickerson	“ “	1815–17
Isaac H. Williamson	“ “	1817–29
Garret D. Wall (declined)	Democrat	1829
Peter D. Vroom	“	1829–32
Samuel L. Southard	Whig	1832–33
Elias P. Seeley	Democrat	1833
Peter D. Vroom	“	1833–36
Philemon Dickerson	“	1836–37
William Pennington	Whig	1837–43
Daniel Haines	Democrat	1843–44
Charles C. Stratton	Whig	1845–48
Daniel Haines	Democrat	1848–51
George F. Fort	“	1851–54
Rodman M. Price	“	1854–57
Wm. A. Newell	American	1857–60
Charles S. Olden	“	1860–63
Joel Parker	Democrat	1863–66
Marcus L. Ward	Republican	1866–69
Theodore F. Randolph	Democrat	1869–72
Joel Parker	“	1872–75
Joseph D. Bedle	“	1875–78
George B. McClellan	“	1878–81
George C. Ludlow	“	1881–84
Leon Abbett	“	1884–87
Robert S. Green	“	1887–90
Leon Abbett	“	1890–93
George T. Werts	“	1893–96
John W. Griggs	Republican	1896–98
David O. Watkins (acting)	“	1898
Foster M. Voorhees	“	1898–1902
Franklin Murphy	“	1902–05
Edward C. Stokes	“	1905–08
John Franklin Fort	“	1908–11
Woodrow Wilson	Democrat	1911–13
John F. Fielder	“	1913–

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NEW JERSEY, College of. See Princeton University.

NEW JERSEY PLAN. See Paterson, William; New Jersey, *History*.

NEW JERSEY TEA. An American shrub. See Ceanothus, and Plate of Mint, etc.

NEW JERUSALEM CHURCH. See Swedenborgians.

NEW KEN′SINGTON. A borough in Westmoreland Co., Pa., 18 miles by rail northeast of Pittsburgh on the Allegheny River (navigable) and on the Pennsylvania Railroad (Map: Pennsylvania, B 6). It is known as a centre of large aluminum, steel and iron industries, and for its brewing interests. There are also in the vicinity manufactories of glass and white lead, and vast deposits of coal. The borough contains the Citizens General Hospital, and excellent municipal and school buildings. Pop., 1900, 4665; 1910, 7707.

NEW LAN′ARK. A village near Lanark, Scotland, where Robert Owen put into operation his plans for industrial reorganization looking towards the betterment of the workingman. See Lanark; Owen, Robert.

NEW′LANDS, Francis Griffith (1848–). An American legislator born near Natchez, Miss. He studied at Yale College and at the Law School of Columbian (now George Washington) University, and for a time practiced law in San Francisco. Appointed trustee of the estate of his father-in-law, Wm. Sharon, once senator from Nevada, he removed his residence to that State in 1888, settling in Reno. He immediately became interested in irrigation and reclamation schemes and advocated state ownership of irrigation facilities. He was also an eloquent and popular advocate of the free coinage of silver. On these ideas as political issues, he was elected as a Democrat to the House of Representatives in 1893, continuing there by reëlection until 1903, when he was chosen to succeed J. P. Jones as United States Senator. While in the House, Newlands had become widely known as the author of a bill providing that moneys collected from the sale of public lands should be devoted to irrigation projects (the Reclamation Act, 1902). He was reëlected to the Senate in 1909 and 1914. In that body, he rose to an influential place in party councils and participated prominently in such important legislation as railroad rate laws, internal improvement measures, regulation of industrial combinations, and tariff bills. The Newlands Act of 1913 provided means for mediation and arbitration in railroad wage controversies. In 1914 a leading, perhaps the controlling, part in framing the Interstate Trade Commission Act was taken by Senator Newlands.

NEW LAUENBURG, lou′en-bụrg (formerly Duke of York Group). A small yet important group in the Bismarck Archipelago (q.v.), consisting of the island of Mánuan with three small companions, Makadá to the north, Ulu and Mióko to the south, of which the last is the most important as the mission and commercial centre. The group lies in the fairway of St. George's Channel just north of its narrowest point and is midway between the north point of the Gazelle Peninsula (New Pomerania) and New Mecklenburg.

NEW LAWS. A code promulgated by Charles V at Madrid in 1543 for the protection of the Indians in the Spanish colonies. The New Laws (Sp. *Nuevas Ordenanzas*), which were due to the influence of Bartolomé de Las Casas, "the Apostle of the Indies," restricted slavery and provided for the religious instruction of the Indians. The laws were opposed by the colonists, and in Peru were largely the cause of the rebellion under Gonzalo Pizarro. By 1560 they had ceased to be effective.

NEW LEB′ANON. A town in Columbia Co., N. Y., 24 miles southeast of Albany, on the Rutland Railroad (Map: New York, G 6). It includes several villages, among which Lebanon Springs, a popular summer resort, noted for thermal springs, and Mount Lebanon, the site of a Shaker village, are best known. The town is engaged principally in agriculture, and in manufacturing patent medicines, flour, lumber, chairs, brooms, and baskets. Pop., 1910, 1378.

NEW LEINSTER, lĕn′stẽr. The former name of Stewart Island. See New Zealand.

NEW LEON. See Nuevo León.

NEW LEX′INGTON. A town and the county seat of Perry Co., Ohio, 21 miles south by west of Zanesville, on the Toledo and Ohio Central and the Pennsylvania Company railroads (Map: Ohio, F 6). It has St. Aloysius Academy, for girls, founded in 1874, and a handsome courthouse. There are some manufactures, roofing-tile and clay-products works being among the leading establishments, and in the vicinity are extensive coal fields and vast deposits of clay, natural gas, and oil. The water works are owned by the town. Pop., 1900, 1701; 1910, 2559.

NEW LIGHT. A fish. See Crappie.

NEW LISKEARD, lĭs′kärd. A town in Timiskaming District, Ontario, Canada, situated at the head of Lake Timiskaming and on the Timiskaming and Northern Ontario Railway, 5 miles north of Haileybury (Map: Ontario, K 9). It contains a public library and a hospital. Its industrial establishments include several sawmills, brickyards, a foundry and a grist mill. The town owns its electric-lighting system and water works. Pop., 1911, 2108; 1915 (civic census), 3000.

NEW LON′DON. A city, port of entry, and one of the county seats of New London Co., Conn., 13 miles south of Norwich, the other county seat, and 51 miles east of New Haven, on the Thames River, about 3 miles above its entrance into Long Island Sound, and on the New York, New Haven, and Hartford and the Central Vermont railroads (Map: Connecticut, G 4). It has direct communication with New York by steamboat, and an excellent harbor. Just above the city, on the east side of the river, is a small United States naval station. New London is a delightful place of residence and popular resort in summer. Among its features of interest are a fine soldiers' and sailors' monument, two memorial hospitals, the county courthouse, erected in 1784, a handsome public library, the New London County Historical Society and Library, the Hempstead House, one of the oldest houses in Connecticut, the Old Town Mill, erected about 1650 and still in operation, the little schoolhouse in which Nathan Hale was a teacher, Riverside Park on the Thames, Ocean Beach, a popular and attractive bathing beach, Williams Park, Memorial Park, Fort Griswold, standing since the Revolution on Groton Heights, and the great railroad drawbridge spanning the Thames. A pier on the Thames River, for which the State appropriated $1,000,000, is now (1915) being constructed. The annual Yale-Harvard boat race, which attracts thousands of visitors, is rowed on the Thames. The city also contains the Connecticut College for Women and the School of Instruction for the United States Revenue Cutter Service. New London was formerly the seat of extensive whaling and sealing interests, but manufacturing is now the leading industry. The principal establishments are silk mills, brass and copper tube works, oil-engine works, ship yards, foundries and machine shops, a cotton-gin factory, bed-quilt mills, and printing-press works. The government, under a charter of 1894, revised in 1905, is administered by a mayor, chosen every three years, and a unicameral council that controls elections to subordinate departments, excepting that of the schools, which is chosen by popular vote. The waterworks are owned and operated by the municipality. Pop., 1900, 17,548; 1910, 19,659; 1914 (U. S. est.), 20,557.

New London was founded in 1646 by John Winthrop, the younger, to whose memory a splendid statue has been erected, and until 1658, when it received its present name, was known as Nameaug. During the "Great Awakening" of 1741 there was a remarkable manifestation of religious enthusiasm here. On Sept. 6, 1781, General Arnold, at the head of a large British force, and assisted by a fleet of 32 vessels, attacked New London, killed a number of its inhabitants, and burned nearly all of the wharves and stores. (See Groton.) New London was incorporated in 1784. Consult: Caulkins, *History of New London* (New London, new ed., 1900); Starr, *A Centennial Historical Sketch of the Town of New London* (ib., 1876); and an article, "Historic New London," in *New England Magazine*, vol. v (Boston, 1887).

NEW LONDON. A city in Waupaca Co., Wis., 20 miles northwest of Appleton, on Wolf River and on the Chicago and Northwestern and the Green Bay and Western railroads (Map: Wisconsin, E 4). It has a Carnegie library and attractive city hall and school buildings. There are lumber mills, a condensed milk plant and manufactories of beehives, furniture, and machinery. New London owns its water works and electric-light plant. Pop., 1900, 2742; 1910, 3382.

NEW MAD'RID. A city and the county seat of New Madrid Co., Mo., 42 miles by rail south by west of Cairo, Ill., on the Mississippi River and on the St. Louis Southwestern Railroad (Map: Missouri, G 5). The centre of a productive region, it has a river commerce in grain, cotton, live stock, etc. There are cotton-gins and manufactories of lumber, veneer, and staves. The water works are owned by the city. Pop., 1900, 1489; 1910, 1882. New Madrid was founded in 1788 by American frontiersmen. For a time during the Civil War it was an important Confederate military station, but on March 14, 1862, it was abandoned and fell into the hands of the Federal forces.

NEWMAN, nū'man, Allen George (1875–). An American sculptor. He was born in New York, where he studied at the National Academy of Design. His works are chiefly monumental and include "The Triumph of Peace" (Atlanta, Ga.); "The Hiker," Spanish-American War Soldier (Providence, R. I.); monuments to Henry Hudson (New York), General Sheridan (Scranton, Pa.), Joel Chandler Harris (Atlanta, Ga.); Monument to the Women of the South (Jacksonville, Fla.); the figures "Day" and "Night," Harriman National Bank (New York); the statues of General Oates (Montgomery, Ala.) and General Stirling Price (Keytesville, Mo.); and others.

NEWMAN, Edward (1801–76). An English naturalist and publisher, born at Hampstead in Middlesex. In boyhood he showed an unusual interest in natural history, and, though engaged in various business enterprises, throughout his life he devoted much time to scientific study. He was one of the four founders of the Entomological Club in London (1826), out of which, largely through his efforts, grew the Entomological Society (1833). In 1840 he established *The Entomologist*, which three years later he incorporated in *The Zoölogist*, and this magazine he edited until 1863. In 1842 he gave his collection of insects to a museum founded by the Entomological Club. Newman also founded *The Phytologist*, to which he contributed from 1841 to 1854, and from 1858 until his death he was the natural history editor of the *Field*. Among his works are: *Grammar of Entomology* (2d ed., 1841); *History of British Ferns* (1840), an accurate work, illustrated by the author and subsequently greatly enlarged; *Birdsnesting* (1861); an edition of Montagu's *Dictionary of British Birds* (1866); *Illustrated History of British Moths* (1869); and of *Butterflies* (1870–71). His contributions to the *Field* contain some of the first work done in economic entomology.

NEWMAN, Francis (?–1660). An English colonist in America, Governor of New Haven Colony in 1658–59. He was born in England and emigrated to New Hampshire in 1638, but after a few months removed to the Connecticut valley and became prominent in the affairs of the colony at New Haven. There he served as an ensign and lieutenant in the colonial militia or trained bands (1642–45), as secretary of the colony under Governor Theophilus Eaton (1646–47), and as a magistrate and assistant in 1653. In the latter year he was one of the commissioners sent from the Connecticut River towns to Manhattan to demand reparation of Peter Stuyvesant, Governor of New Netherlands, for injuries sustained by the English colonists at the hands of the Dutch. In July, 1654, he became one of the commissioners of the United Colonies of New England, and in May, 1658, he succeeded Eaton as Governor of the New Haven Colony, retaining the office until September, 1659.

NEWMAN, Francis William (1805–97). An English scholar and writer, brother of John Henry Newman. He was born in London, June 27, 1805, and, with his brothers, attended the school at Ealing. Thence he passed to Worcester College, Oxford, and in 1826 obtained a fellowship in Balliol College. He withdrew from the university in 1830, declining the subscription to the Thirty-nine Articles. He went as a missionary to Bagdad; then on his return to England, finding himself out of harmony with the prevailing theology, became classical tutor in Bristol College (1834). In 1840 he accepted a similar professorship in Manchester New College, and in 1846 was appointed to the chair of Latin in University College, London, which he held till 1869. During all this time he was an active contributor to literary and scientific periodicals, and maintained a leading part in the controversies on religion, in which he took the line directly opposite to that chosen by his elder brother, being no less ardent as a disciple of the extreme rationalistic school than John Henry

Newman of the dogmatical. In his later life he was a member of the Unitarian Association. His work called *Phases of Faith, or Passages from the History of My Creed* (1850), constitutes a religious autobiography, recounting Newman's transformation from a Calvinist to a rationalistic theist. In 1849 he had published *The Soul, its Sorrows and its Aspirations*, a sympathetic though trenchant examination of man's spiritual nature in its relation to God. Probably for these two books, strongly personal and earnest and less eccentric than most of his other writings, Newman will be best remembered. He was extraordinarily versatile and treated his many subjects with marked enthusiasm and ability. Of his many publications, those regarding religious controversy, besides the two already mentioned, include: *Catholic Union: Essays Towards a Church of the Future* (1844); *A State Church Not Defensible* (1845). Political and social topics are represented by: *Radical Reforms, Financial and Organic* (1848); *Lectures on Political Economy* (1851); *On the State Provision for Vice* (1871); *Remedies for the Great Social Evil* (1889); *Europe of the Near Future* (1871). A large number are devoted to historical, classical, and scientific subjects, the most important of which are: *Contrasts of Ancient and Modern History* (1847); translations into "unrhymed metre" of the *Odes of Horace* (1853) and the *Iliad of Homer* (1856); a treatise on *Difficulties of Elementary Geometry* (1841); *Handbook of Modern Arabic* (1866); *Orthoepy* (1869); *Miscellanies* (1869–89); *Dictionary of Modern Arabic* (1871); *Early History of Cardinal Newman* (1891). He died at Weston-super-Mare, Oct. 4, 1897. Consult I. G. Sieveking, *Memoir and Letters* (London, 1909).

NEWMAN, JOHN HENRY, CARDINAL (1801–90). An English religious leader, first in the Church of England and later in the Roman Catholic church. He was born in London, Feb. 21, 1801, and educated first at a private school at Ealing, then at Trinity College, Oxford, which he entered at 15. He won a scholarship two years later, and took his degree in 1820. In 1822 he was elected to a fellowship at Oriel, then the highest distinction of Oxford scholarship, which brought him into close relations with many of the most distinguished men of the time; among them was a brother fellow, Edward Bouverie Pusey, with whom he was to be most closely associated in the work of the Oxford Movement. He was ordained deacon in 1824, and combined with his college position the curacy of St. Clement's Church. A year later, his friend Whately having become principal of St. Alban's Hall, Newman was made vice principal, but resigned the appointment on being named tutor in his own college (1826). In 1828, on the election of Hawkins as provost of Oriel (partly through Newman's influence, though Keble was also a candidate), Newman succeeded him as vicar of St. Mary's, the university church, and the position which he thus gained gave him a commanding power, by the wonderful sermons which he preached in this pulpit, over a whole generation. He resigned his tutorship in 1832, owing to differences with Hawkins as to college arrangements. He made his first visit to the Continent soon afterward and returned in time to hear Keble's famous assize sermon on National Apostasy (July 14, 1833), which he always considered as the actual origin of the Oxford Movement. (For the complete history of its development, see OXFORD MOVEMENT.) Here it is enough to say that from the first Newman was its acknowledged head; the charm of his personality, the ascetic fervor of his life, and the fame of his preaching gave him a tremendous power. He was one of the chief contributors to the *Tracts for the Times*, 29 of which, including the famous No. 90, which proved the end of the series, are from his pen. The same year that witnessed their beginning (1833) saw the publication of his book on *The Arians*, which was followed in 1837 by *The Prophetical Office of the Church;* in 1838 by works on Justification, on the Canon of Scripture, and on Antichrist. In this year also Newman became editor of the *British Critic*, holding the position until 1841, and began in conjunction with Keble and Pusey to publish a Library of Translations from the Greek and Latin Fathers. On a formal request from the Bishop of Oxford, he discontinued the publication of the *Tracts* in 1841, after the storm of opposition which No. 90, "Remarks on Certain Passages in the XXXIX Articles," had aroused by its claim that certain Catholic doctrines are allowed by the standards of the Church of England.

Already in 1839 in the course of his study of the history of the Monophysite controversy a doubt had come to him whether, after all, the Anglican position was tenable; and the condemnation of his position by bishops and heads of colleges showed him that his place in the Movement was gone. Parallel reasoning on the history of the Arian controversy, and the curious compromise of the Jerusalem bishopric (see JERUSALEM), still further shook his allegiance to the Church of England.

In 1842 he retired from Oxford to the neighboring village of Littlemore, where he passed three years in seclusion, with a number of young men who had attached themselves to him, wrestling in silence with the problem thus presented to him. In the early part of 1842 he published a formal retractation of his adverse criticisms of the Roman Catholic church, and in the following autumn, while he had not yet made up his mind, it seemed to him more honest to resign his living. The train of reasoning which occupied him throughout 1845, when he was engaged in the composition of his *Essay on the Development of Christian Doctrine*, finally brought him to the point, and on October 9th he became a Roman Catholic.

As his influence in Oxford and among the high-church Anglicans had been tremendous, so the effect of this step was correspondingly great. A year after his reception he went to Rome and was there ordained priest. Soon afterward he returned to England and introduced the Congregation of the Oratory (q.v.), which he thought specially adapted to the needs of the large towns. The greater part of his later life was spent in the house of the Oratory at Birmingham; from 1854 to 1858, however, he was in Dublin, as rector of the unsuccessful Catholic University there. Always deeply interested in education, he had planned to establish a house of the Oratory at Oxford, which might have allowed the young men of his church to gain the advantages of the university; the project, opposed by Manning, fell through, but since his death his ideas have been vindicated by the establishment of a Catholic hall there. Constant literary activity marked all these years, of which the most remarkable fruits were his *Letter to the Duke of Norfolk* (1875), in which he explained and defended the position of Catholics as affected by the Vatican decrees in their bearing on civil allegiance, in reply to Gladstone; and his memorable *Apologia pro Vita Sua* (1864), which contained a most striking account of the inner workings of his mind during his whole manhood, and increased the veneration felt for him by all his countrymen, of whatever shade of theological opinion. It grew out of a memorable controversy with Charles Kingsley. In 1877 Newman was elected an honorary fellow of Trinity College, Oxford, and revisited his loved *alma mater* for the first time in 22 years. Leo XIII created him Cardinal in 1879, allowing him still to reside in England. He died at Birmingham, Aug. 11, 1890.

Both as a great spiritual force and as a master of literary expression, Newman will always deserve a large space in any history of nineteenth-century England. His literary style, always pure, melodious, and elevated, and owing much to years of familiarity with the Authorized Version of the Bible, is full of undecaying beauty. But it was only an expression of his mental habit. The dialectical skill which marks all his controversial work was governed by the conscience whose supremacy he was never tired of enforcing; and the chaste beauty of his style was but the outcome of an intense realization of the spiritual world. A complete list of his writings would occupy too much space. A uniform edition of the more important of them was published under his own supervision (London, 1868–81; new ed., 1895). Besides those already named, mention should be made of his: *Essay in Aid of a Grammar of Assent* (1870); two works of fiction, *Callista, a Sketch of the Third Century* (1856), and *Loss and Gain*, a story of Oxford life in his own day (1848); numerous volumes of sermons, all characterized by his qualities; and some extremely beautiful verse, of which the best, with "The Dream of Gerontius," is included in *Verses on Various Occasions* (1868). *Poems: Valdesso's Divine Considerations* was published in 1905.

Bibliography. The principal sources for the life of Newman are his *Apologia pro Vita Sua*, first published in 1864, with many subsequent editions, a satisfactory recent one being in *Everyman's Library* (New York, 1913), containing a bibliography; his *Letters and Correspondence during his Life in the Anglican Church*, ed. by Anne Mozley (2 vols., London, 1891), these to be supplemented by Wilfred Ward, *Life of John Henry, Cardinal Newman, Based on his Private Journals and Correspondence* (2 vols., ib., 1912); and by Joseph Rickaby, *Index to the Works of John Henry, Cardinal Newman* (ib., 1914). Also: J. C. Shairp, *Studies in Poetry and Philosophy* (New York, 1872); R. H. Hutton, *Cardinal Newman*, in "English Leaders of Religion" (London, 1891); E. A. Abbott, *The Anglican Career of Cardinal Newman* (2 vols., New York, 1892); R. H. Hutton, *Essays on some of the Modern Guides of English Thought in Matters of Faith* (ib., 1900); Alexander Whyte, *Newman* (ib., 1902); William Barry, *Newman* (ib., 1904); L. O. Brastow, *Representative Modern Preachers* (ib., 1904); Henri Brémond, *Mystery of Newman*, trans. by H. C. Corrance (London, 1907), containing a bibliography; Charles Sarolea, *Cardinal Newman and his Influence on Religious Life and Thought* (New York, 1908); P. E. More, "The Drift of Romanticism," in *Shelburne Essays, Eighth Series* (ib., 1913); Paul Thureau-Dangin, *English Catholic Revival in the 19th Century* (2 vols., London, 1914). See OXFORD MOVEMENT.

NEWMAN, JOHN PHILIP (1826–99). An American Methodist Episcopal bishop. He was born in New York City and was educated at Cazenovia (N. Y.) Seminary, which he left in 1848 to enter the ministry. He filled different pastorates until 1860, when he went abroad for travel and study, visiting Egypt and Palestine, and subsequently writing *From Dan to Beersheba, or the Land of Promise as It Now Appears* (1864). After New Orleans was taken by the Federal army in 1862, Dr. Newman was sent there to organize the Methodist Episcopal church, and remained until 1869, meanwhile editing the *New Orleans Advocate*. Afterward he was pastor of the Metropolitan Church at Washington, D. C., until 1872, when President Grant appointed him inspector of consulates in Asia. In this capacity he made a tour of the world, publishing his observations as *The Thrones and Palaces of Babylon and Nineveh from the Persian Gulf to the Mediterranean* (1876). In 1878 he accepted a call to the Central Church, New York, and in 1881 was a delegate to the first Ecumenical Methodist Conference in London, where he read a notable essay on *Scriptural Holiness*. From 1882 to 1884 he was acting pastor of the Madison Avenue Congregational Church, New York, returning the next year to the Metropolitan Church, Washington. In 1888 he was elected bishop of the Methodist Episcopal church, with his official residence at Omaha, Neb. Bishop Newman was a popular preacher, whose eloquence was of an ornate and stately character. Additional of his writings include: *Christianity Triumphant* (1884); *Evenings with the Prophets on the Lost Empires* (1887); *The Supremacy of Law* (1890); and the posthumous *Conversations with Christ* (1901).

NEW'MARCH, WILLIAM (1820–82). An English banker and statistician. He was born at Thirsk, Yorkshire; was in the banking business from 1843 to 1851, when he became secretary of the Globe Insurance Company; and from 1862 to 1881 was chief officer of the banking house of Glyn, Mills & Co. He contributed extensively on banking and commercial topics to the *Morning Chronicle*, the *Times*, the *Pall Mall Gazette*, the *Fortnightly Review*, the *Statist*, and the *Economist*, for which he wrote the commercial history of each year from 1863 to 1882. He was president of the Royal Statistical Society in 1869–71, and for five years was editor of its *Journal*. With Thomas Tooke, Newmarch published a *History of Prices* (1857).

NEW'MARKET. A market town on the border of Suffolk and Cambridgeshire, England, 14 miles northeast of Cambridge (Map: England, G 4). The market house and the celebrated Jockey Club are the chief edifices. The town owes its prosperity to the horse races. The race course of Newmarket, upward of 4 miles in length, is said to be the finest in the world, and the training ground bears a similar reputation for excellence. Eight race meetings are held here annually, the best known being "The Thousand Guineas" in April and "The Cesarewitch" in October. Racing was instituted here by Charles I. Pop., 1901, 10,688; 1911, 10,482. Consult Hore, *History of Newmarket and Annals of the Turf* (3 vols., London, 1886).

NEWMARKET. A town of York County, Ontario, Canada, on the Holland River and on the Grand Trunk Railway, 34 miles north-northwest of Toronto (Map: Ontario, E 5). It has busy trading interests and some manufactures, including woodenware, flour, lumber, and canneries. Pop., 1901, 2125; 1911, 2996.

NEWMARKET. A town in Rockingham Co., N. H., 10 miles by rail south by west of Dover, on the Lamprey River, and on the Boston and Maine Railroad (Map: New Hampshire, J 7). Notable features are the high school and public library buildings and John Webster Hall. The manufacture of silk and cotton goods is the town's chief industry. Newmarket was incorporated in December, 1727, having previously been part of Exeter. The water works are the property of the municipality. Pop., 1900, 2892; 1910, 3348.

NEW MECK'LENBURG (formerly NEW IRELAND). The second largest island of the Bismarck Archipelago (q.v.), situated in the Pacific Ocean, 350 miles northeast of New Guinea, and separated from New Pomerania, the largest of the group, by St. George's Channel (Map: Australasia, H 3). It is elongated and very narrow, has an estimated area of 4920 square miles, and consists for the most part of mountains covered with forests of large trees. Little is known of the interior of the island, but the coast lands are very fertile. Colonization or attempt at agricultural exploitation of the littoral has not been attempted since the disaster which overtook the ill-judged colony of the Marquis de Rays in 1880 at the south tip of the island. The indigenous population is scanty, the people are Melanesians of a low type. and there are several distinct languages.

NEW MERV. See MERV.

NEW MEX'ICO. A State of the plateau group of the United States, at the south end of the Rocky Mountains. It lies south of Colorado, west of Oklahoma and Texas, north of Texas and Mexico, and east of Arizona. The extreme boundaries are parallels 31° 20′ (approximately) and 36° 59′ 36″, and meridians 103° 03′ 02.3″ and 109° 03′ 02.3″. But for the recumbent L-shaped block south of parallel 32°, the State would be nearly a perfect square, measuring 344.5 miles north and south and 346.2 miles east and west. Including 131 square miles of water surface, the area is 122,634 square miles, or 98 times the size of Rhode Island, and 0.45 times that of Texas.

Topography. The State might be described briefly as a vast, gently undulating plain dotted with steep, rocky mountains and intersected by a few valleys. The maximum relief is 10,430 feet, or from 13,360 feet on Truchas Peak (north) to 2876 at Red Bluff, in the southern Rio Pecos valley. The average altitude is 5700 feet. From where the complex mountain masses of the southern Rockies (Sangre de Cristo, Jemez, and Santa Fe groups) dip under the plains, in the vicinity of Santa Fe, ranges of both the volcanic and tilted block types trend roughly parallel southward across the highlands west of the Rio Pecos.

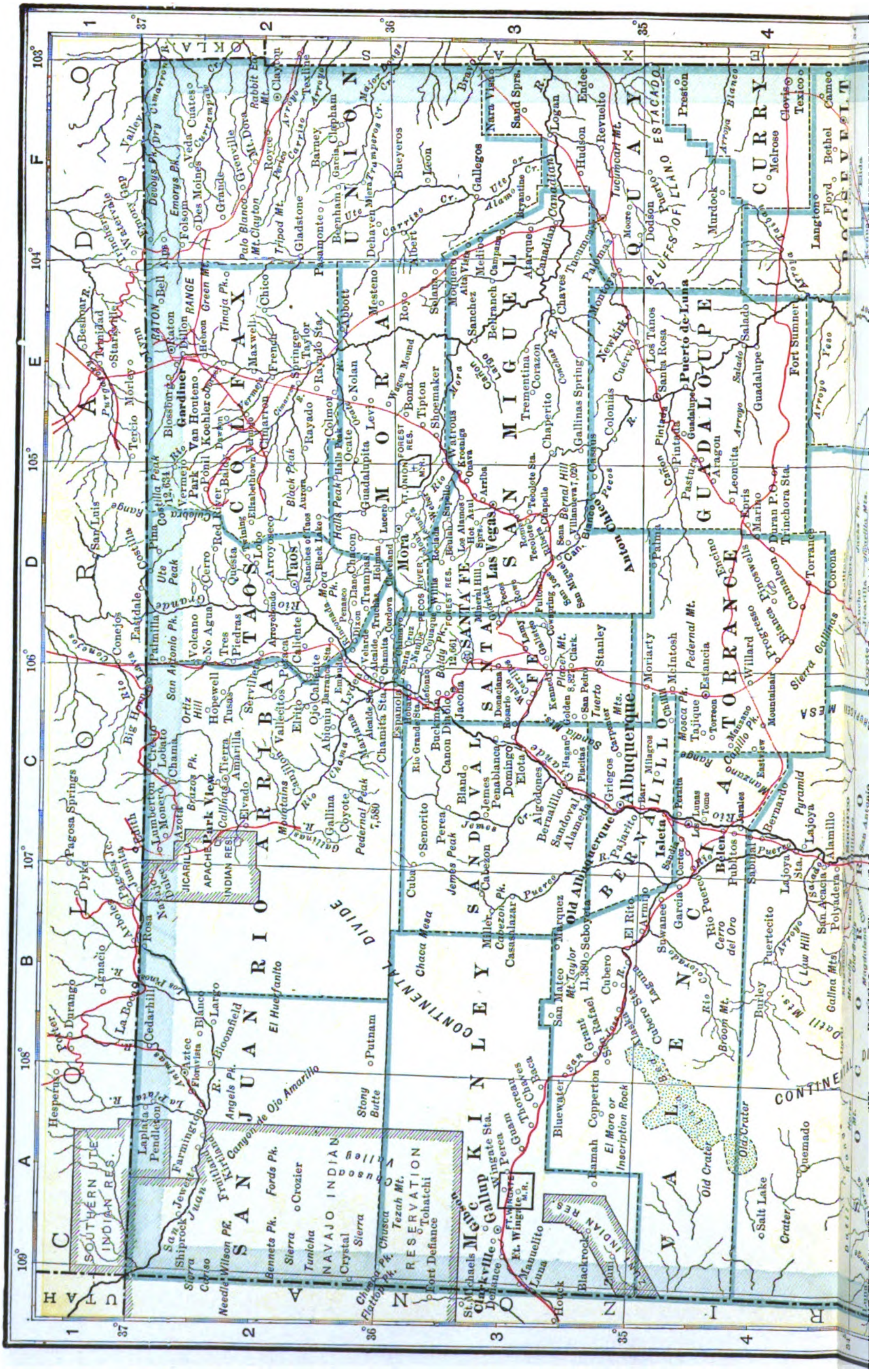
Hydrography. The Continental Divide trends southwesterly across the western part. On the Atlantic side of it are the Pecos-Grande drainage (southerly) and the Cimarron-Canadian (Arkansas-Mississippi) drainage (easterly), while on the Pacific side are the San Juan, Rio Puerco, San Francisco, and Gila (Colorado) drainage (westerly). Many local streams from the mountains sink into the sands to reappear as springs, sometimes in inclosed basins.

Climate. This Sunshine State averages in the year about 214 clear and 99 partly cloudy days. Average temperatures are: winter, 35° F.; summer, 71° F.; annual, 53° F. At this latitude great extremes of temperature rarely occur. Precipitation ranges from 6 inches annually in the southwestern valleys to 30 inches in the northern mountains, averaging above 14 inches. Humidity averages only 46 per cent at Santa Fe, resulting in a mild, dry, invigorating climate.

Soil and Vegetation. Some limestone soils exist, but the limy-clay and loam types are most common. All are productive when watered, except where swampy or saline. More than 90 per cent of the original area was either open prairie or woodland grazing range, upon which grew mainly blue grama (north) and black grama (south), with some salt grass, hairy grama, and Arizona fescue. On the more arid plains sagebrush, with occasional mesquite, Spanish bayonet, and cacti, are common perennial shrubs and herbs. Cottonwoods, willows, box elders, and a few other deciduous trees cling to the lowland stream lines, while oaks, elms, hickories, and still other broad-leaf trees are associated with the conifers in the mountains. Junipers, cedars, and piñons grow singly and in groves on the highlands and foothills. About 15 million acres, or 22 billion board feet, of evergreen saw timber stand in the State, chiefly in the mountains.

Geology. Probably one-fifth of the State's area is made up of igneous rocks. One-seventh of such exposures—mainly at the north—are probably pre-Cambrian and are generally intruded into a pre-Cambrian metamorphic series of quartzite, schist, and scanty limestone. All lower Paleozoic systems are represented by clastic and non-clastic sediments as far north as 33° 30′. Lower Carboniferous (Mississippian or mountain limestone) continues probably somewhat past 35°, and is succeeded by reddish Upper Carboniferous (Pennsylvanian) shale and sandstone, with limestone and gypsum, upon which are rusty Permian sandstone, shale, and gypsum. Mesozoic is widely represented by a heavy succession of tawny to reddish sandstones and darker shales, with a thin limestone member (Mancos) and abundant workable coal (Mesaverde and Laramie). In Cenozoic the Puerco (Eocene) beds were deposited as land sediments over some 5000 square miles of northwestern New Mexico. Many remains of volcanic action, as well as prominent folds and faults, of the middle and western part are also of Tertiary age. Local (Pleistocene) glaciation has occurred in the high mountains at the north. Huge talus slopes, cones, fans, bolsons, dunes, flood plains, and the like, are the result of the extensive mechanical weathering and violent wind and stream action of present day.

Mining. Until 1912 New Mexico owed its importance as a mineral-producing State rather to its production of coal than of its metals. In that year the development of the copper mines in the Santa Rita district, on the large deposits of the low-grade ores by one company who operated on a large scale, brought up the value


COLORADO
OKLA
TEXAS
UTAH
ARIZONA
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
UNION
MORA
SAN MIGUEL
QUAY
CURRY
GUADALUPE
SANTA FE
SANDOVAL
McKINLEY
BERNALILLO
VALENCIA
TORRANCE
NAVAJO INDIAN RESERVATION
SOUTHERN UTE INDIAN RES.
JICARILLA APACHE INDIAN RES.
CONTINENTAL DIVIDE
Santa Fe
Albuquerque
Las Vegas
Raton
Gallup
Farmington
Aztec
Taos
Clayton
Tucumcari
Santa Rosa
Puerto de Luna
Fort Sumner
Estancia
Bernalillo
Belen
Los Lunas
Isleta
Springer
Cimarron
Maxwell
Mora
Durango
Trinidad
Antonito
Chama
Espanola
Shiprock
Ft. Wingate
Zuni
Grants
Laguna
Socorro
Magdalena
Clovis
Texico
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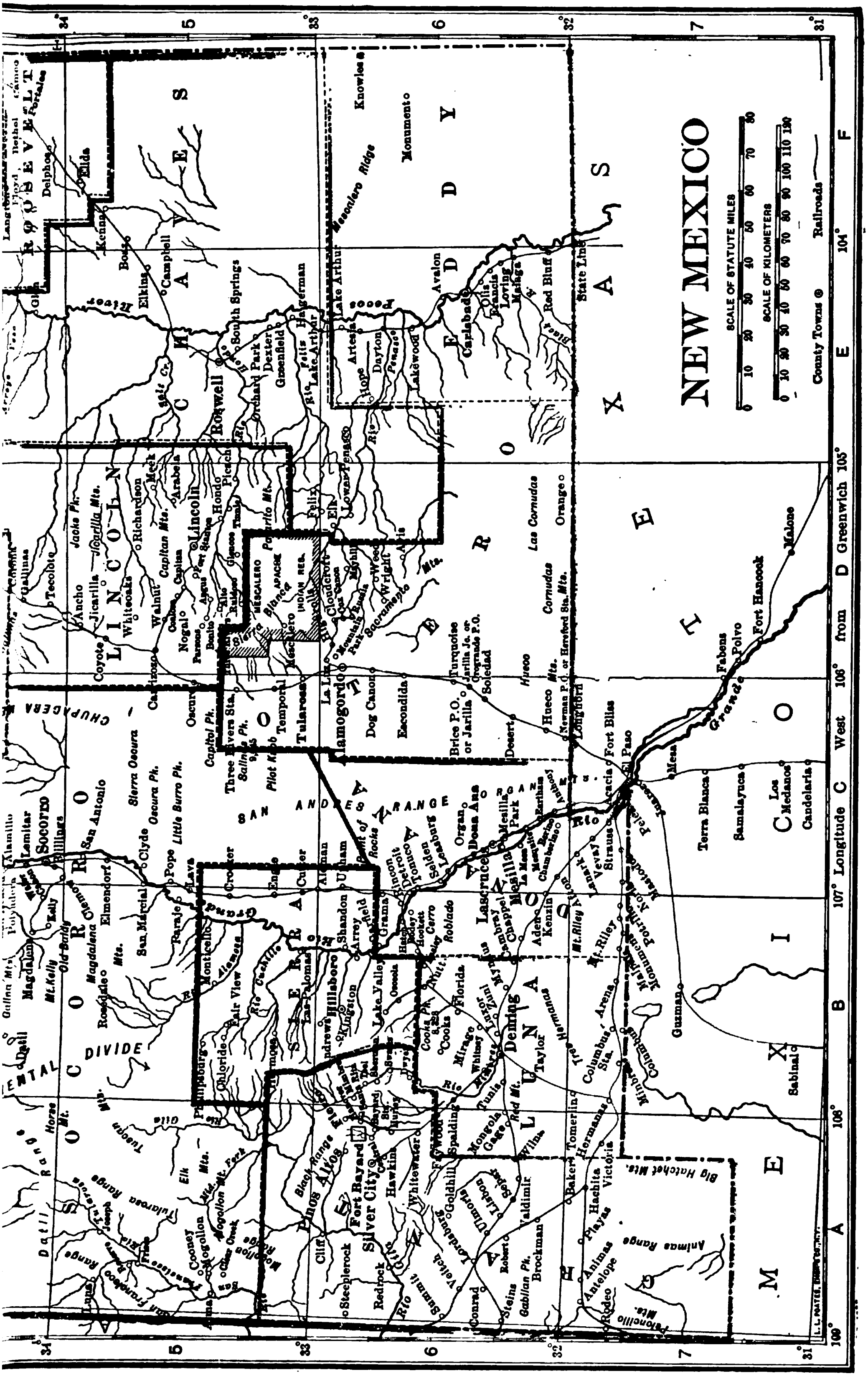
Logan
Nara Visa
Des Moines
Folsom
Roy
Wagon Mound
Watrous
Pecos
Cerrillos
Willard
Mountainair
Moriarty
Corona
Torrance
Costilla Peak 12,634
Mt. Taylor 11,389
Baldy Pk. 12,661
Truchas Pk.
Ute Peak
Rabbit Ear Mt.
Sandia Mts.
Manzano Range
Ortiz Mts.
Sierra Gallinas
El Morro or Inscription Rock
Rio Grande
Pecos R.
Canadian R.
Cimarron R.
Chama R.
Rio Puerco
San Juan R.
Gallinas R.
LLANO ESTACADO
BLUFFS OF LLANO
103°
104°
105°
106°
107°
108°
109°
37
36
35
A
B
C
D
E
F
1
2
3
4


NEW MEXICO
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100 110 120 130
County Towns ◎
Railroads
107° Longitude West from Greenwich 105°
104°
108°
109°
106°
A
B
C
D
E
F
34°
33°
32°
31°
5
6
7
SOCORRO
LINCOLN
CHAVES
ROOSEVELT
EDDY
OTERO
DONA ANA
SIERRA
GRANT
LUNA
T E X A S
M E X I C O
CONTINENTAL DIVIDE
SAN ANDRES RANGE
MESCALERO APACHE INDIAN RES.
Socorro
Roswell
Lincoln
Carlsbad
Alamogordo
Tularosa
Las Cruces
El Paso
Deming
Silver City
Fort Bayard
Hillsboro
Pinos Altos
Lordsburg
Rio Grande
Pecos River
State Line
Big Hatchet Mts.
Animas Range
Sacramento Mts.
Guadalupe Mts.
Hueco Mts.
Cornudas Mts.
Mogollon Mts.
Black Range
L. L. POATES ENGR. CO., N.Y.

of the output of that metal beyond that of coal. Copper had been mined to a rather small extent since 1845, but until 1900 the production was negligible. In 1911 the copper produced amounted to 4,057,040 pounds, valued at $507,130, and in 1913 it amounted to 56,308,706 pounds, valued at $8,727,850. Second in value among the mineral products is coal. The coal-bearing areas are widely scattered, but the most important section is the Raton field in Colfax County, from which about 75 per cent of the production was obtained in 1912–13. It is a good coking coal, and the operations are carried on on an extensive scale. In 1913 the coal produced amounted to 3,708,806 short tons, valued at $5,401,260. The coke made in that year was 467,945 short tons, valued at $1,548,536. The gold produced in 1913 amounted to 42,663 fine ounces and was valued at $881,926, and the production of silver was 1,631,273 fine ounces, valued at $985,289. Lead and zinc are also produced, and in 1913 the output for the former was 1973 short tons, valued at $173,640, and for the latter 8262 short tons, valued at $925,257. Other commercial products of more or less importance are turquoise, fluor spar, gypsum, iron ore, stone, lime, mica, clay, meerschaum, mineral waters, salt, sand, and gravel. The total value of mineral products in 1913 was $17,862,369.

Agriculture. Of an approximate land area of 78,401,920 acres, 11,270,021 were in farms in 1910. The total number of farms in that year was 35,676, the average number of acres per farm 315.9, and the improved land in farms 1,467,191 acres. The value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $159,447,990.

One of the characteristics of New Mexico is its great area of arid land utilized, if at all, for grazing purposes only. Upon this land are some very large farms or ranches, giving the State a high average number of acres per farm. Of the total number of farms in 1910, 33,719 were operated by owners and managers, and 1957 by tenants. The native white farmers numbered 32,088; the foreign-born white farmers, 1440; and Indian and other non-white farmers, 2148. The greater number of the foreign-born white farmers came from Germany, England, and Canada. Of the nonwhite farmers, 2087 were Indians; the remainder, negroes, Japanese, and Chinese.

The following table gives the acreage, value, and production of the important crops as estimated for 1914 by the United States Department of Agriculture:

CROPS	Acreage	Prod. bu.	Value
Corn	92,000	2,576,000	$2,061,00
Wheat	76,000	1,838,000	1,654,000
Oats	52,000	1,976,000	889,000
Barley	5,000	170,000	128,000
Potatoes	9,000	900,000	855,000
Hay	206,000	*515,000	4,790,000

* Tons

The total value of crops in 1909 was $8,922,000, and the combined acreage was 632,769. Census figures for 1909 show in hay and forage an acreage of 368,409 and a production of 431,053 tons, valued at $4,469,709; in corn an acreage of 85,999 and a production of 1,164,970 bushels, valued at $984,052; in wheat an acreage of 32,341 and a production of 499,799 bushels, valued at $508,726; in oats an acreage of 33,707 and a production of 720,560 bushels, valued at $459,306; in dry edible beans an acreage of 20,766 and a production of 85,795 bushels, valued at $232,023. The total acreage of potatoes and other vegetables in 1909 was 14,660 and their value $820,497. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 8219 and their value $567,000.

The most important orchard fruit is the apple, of which there were produced, in 1909, 417,143 bushels, valued at $420,536. Other orchard fruits are peaches, pears, plums, and prunes. The total quantity of orchard fruits produced in 1909 was 504,059 bushels, valued at $519,677. There were also produced 425,415 pounds of grapes, valued at $16,101. Figs and oranges are grown in small quantities. The most important of the small fruits is the strawberry, of which there were produced, in 1909, 35,634 quarts, valued at $4086. Others are blackberries and dewberries, raspberries and loganberries, and gooseberries. The total production of small fruits in 1909 was 76,532 quarts, valued at $9325. A small amount of sugar cane is grown, the production in 1909 being valued at $3467.

Live Stock and Dairy Products. With its mild climate and vast grassy plains New Mexico possesses unusually favorable conditions for stock raising. The industry ever since the advent of the Spaniards into the country has been of the very first importance. The grazing region is chiefly in the eastern portion. The raising of sheep is the most important branch of the stock-raising industry. The wool produced in 1909 was 3,093,000 fleeces, valued at $3,137,300. The total value of domestic animals on the farms in the same year was $43,191,913. On Jan. 1, 1915, it was estimated by the United States Department of Agriculture that there were 991,000 cattle other than milch cows, valued at $35,180,000. Milch cows numbered 68,000, valued at $4,182,000; horses, 217,000, valued at $11,935,000; mules, 16,000, valued at $1,296,000; sheep, 3,340,000, valued at $11,690,000; swine, 73,000, valued at $715,000. The total value of milk, cream, and butter fat sold and butter and cheese made in 1910 was $726,692. The milk sold amounted to 1,036,922 gallons, valued at $295,634; the butter made to 1,477,617 pounds, valued at $402,263. Fowls of all kinds on the farms numbered 531,625, valued at $256,466.

Irrigation. There were, in 1910, 5854 miles of irrigation ditches. Of the 35,676 farms, 12,795, or 35.9 per cent, were irrigated. The acreage reported irrigated was 461,718, or 31.5 per cent of the total improved land in farms. The area to which irrigation plants existing in 1910 were capable of supplying water was 644,970 acres; and the total acreage included in irrigation projects completed or under way was 1,102,291 acres. In 1913–14 there were under construction three important projects by the United States government, viz., the Carlsbad, the Hondo, and the Rio Grande, the last being partly in Texas. The net investment in these enterprises was over $3,000,000. See Great American Desert.

Forest Products. There were sawed, in 1909, 91,987 M feet B.M. of rough lumber, 10,571 thousands of lath, and 150 thousands of shingles, mostly from coniferous trees. In addition, there were produced on the farms in the same year forest products valued at $253,822. For varieties of timber, see *Soil and Vegetation* above.

Manufactures. The manufactures are little developed. The table below gives the most important information relative to the manufactures in 1909 and 1904. The most important industry is the construction and repair of cars and general shop construction by steam-railroad companies. Second in importance as regards value of products are the manufactures of lumber and timber. Details in regard to this industry will be found in the paragraph on *Forest Products* above. The average number of wage earners in 1909 was 4143, of whom 4058 were males. The wage earners under 16 years of age numbered 66, of whom 63 were males. For the great majority of wage earners the prevailing hours of labor in 1910 were 60 a week and 10 a day. Albuquerque was in 1910 the only city having a population of over 10,000. This city in that year gave employment to 14.2 per cent of the average number of wage earners and produced 16.3 per cent of the total value of products.

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — ALL INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	313	4,766	4,143	$7,743	$2,591	$7,898	$4,637
	1904	199	3,891	3,478	4,638	2,153	5,706	3,470
Bread and other bakery products	1909	32	94	54	100	43	272	118
	1904	27	62	33	64	21	152	65
Brick and tile	1909	13	112	92	330	42	123	91
	1904	10	79	64	42	31	81	63
Cars and general shop construction and repairs by steam-railroad companies	1909	11	1,594	1,489	1,652	1,138	2,251	1,288
	1904	10	1,736	1,667	937	1,229	2,510	1,385
Flour-mill and gristmill products	1909	16	48	28	257	17	462	108
	1904	13	45	29	139	14	388	76
Ice, manufactured	1909	10	69	50	424	33	44	102
	1904	7	32	23	190	20	84	68
Lumber and timber products	1909	76	1,620	1,475	2,374	714	2,162	1,584
	1904	31	1,280	1,170	1,945	565	1,435	1,116
Printing and publishing	1909	93	436	283	516	174	589	468
	1904	56	239	149	277	93	295	240
All other industries	1909	62	793	672	2,090	430	1,895	878
	1904	45	418	343	1,044	180	761	457

Transportation. The total mileage of main track in 1915 was 3031. The more important roads and their mileage are: Atchison, Topeka, and Santa Fe, 1321; Chicago, Rock Island, and Pacific, 153; Southern Pacific, 168; El Paso and Southwestern system, including the Dawson Railway, 132; El Paso and Northeastern, 150; El Paso and Rock Island, 128; El Paso and Southwestern, 195.

Banks. The first bank was a national bank organized in 1871. In 1888 some banks were organized under the Territorial laws. The Territorial Banking Law provided for yearly reports and examinations. On Sept. 12, 1914, there were 38 national banks, with a capital of $2,165,000; surplus, $981,400; cash, etc., $251,036; deposits, $14,988,056; and loans, $13,843,784. On June 30, 1914, there were 30 State banks, with capital of $775,000; surplus, $115,100; cash, etc., $219,816; deposits, $4,100,775; and loans, $3,763,223. There were also 6 loan and trust companies and 11 savings banks.

Government. The present constitution was adopted by the constitutional convention held in 1910 and was accepted by the people in January, 1911. Amendments may be proposed in either House of the Legislature, but in order to become effective must be accepted by a majority vote of both Houses, be published four consecutive weeks, and then passed by the electors at the next regular election or at a special election to be held in less than six months after the adjournment of the Legislature.

Legislative.—The Legislature, consisting of the Senate and the House of Representatives, meets biennially. The Senate has 24 members, the House of Representatives 49. Senators are elected for a term of four years and members of the House of Representatives for two years. A modified form of the referendum is in force.

Executive.—This department consists of the Governor, Lieutenant Governor, Secretary of State, State Auditor, State Treasurer, Attorney-General, Superintendent of Public Instruction, and Commissioner of Public Lands, each elected for a term of two years, none of whom are eligible to hold any State office for two years after service for two consecutive terms.

Judiciary.—The judicial power is vested in a supreme court, district courts, probate courts, justices of the peace, and such inferior courts as may be established by law. There are three supreme court justices and eight district courts, with one judge in each court. Each county has a probate court.

Suffrage and Elections.—Every male citizen of the United States over the age of 21 years, who has resided in the State 12 months, in the county 90 days, and in the precinct in which he offers to vote 30 days, next preceding the election, is qualified to vote. Women may vote at school elections. All candidates for offices are nominated at primary elections. Bribery and the use of influence for registration are felonies, punishable by fine or imprisonment.

Local and Municipal Government.—The usual forms of local and municipal government are cities, counties, and townships. Cities may adopt a commission form of government.

Miscellaneous Statutory Provisions.—There is a State Corporation Commission, which has general control of corporations. The constitution forbids the lease of convict labor and provides an eight-hour day for county and municipal work. There are a white-slave law and an act relating to weights and measures. Under the State laws no saloons are allowed except within the limits of a city, town, or village containing at least 100 inhabitants.

Finances. A public debt of $200,000 was created in 1884 to construct the capitol. Later more bonds were issued for the erection of a penitentiary and other public buildings. There was also a constant deficit due to high expenditures and also to the difficulty of collecting taxes, of which about 25 per cent usually remain unpaid. In 1889 a movement for financial reform gained headway, and the expenditures were decreased by about 50 per cent. Since then the public debt has been somewhat diminished. On Nov. 30, 1913, the bonded debt was $2,185,500. At the beginning of the fiscal year 1913 there was a balance on hand of $655,376. The total receipts for the year were $1,814,238 and the disbursements $1,847,691, leaving a balance on hand at the end of the year of $621,923.

Militia. The organized militia in 1914 consisted of one regiment (12 companies) of infantry, one hospital detachment, and one battery of field artillery. The numerical strength was 940 men and 58 officers.

Population. In 1910 New Mexico ranked forty-fourth in population. The population by decades since its organization as a territory has been as follows: 1850, 61,547; 1860, 93,516; 1870, 91,874; 1880, 119,565; 1890, 160,282; 1900, 195,310; 1910, 327,301. The estimated population on July 1, 1914, was 383,551. In 1910 the number of persons per square mile was 2.7; the urban population (in places of 2500 or more) 46,571, the rural 280,730. The native white population was 281,940; the foreign-born white, 22,654; Indian (almost entirely Pueblo), 20,573; and negro, 1594. Of the foreign-born over one-half come from Mexico. By sex the population was divided into 175,245 males and 152,056 females. Males of militia age numbered 73,097; the voting population, 94,637. The one city, Albuquerque, with a population in 1910 of 8000 or over, had in that year 10,020 inhabitants and in 1914 an estimated population of 13,057.

Education. The character and distribution of its population make the educational problems in New Mexico unusually difficult. When New Mexico became a portion of the United States in 1848, there were brought into the United States about 90,000 alien people who did not speak English. The Federal government did little to improve educational institutions, and New Mexico did not, as a Territory, have a public-school law until 1891. In 1910, 48,697 persons of 10 years of age or over, or 20.2 per cent of the total population, were illiterate. The percentage of native whites of native parentage was 15.5 per cent, of foreign-born whites 31 per cent, and of negroes 19.1. The total school population in 1910 was 100,045, of which 61,027 attended school. The State school census for the year 1913–14 showed 102,068 of school age (5 to 21), 67,147 enrolled in the elementary and public high schools, and 49,823 in average daily attendance. In the same year there were 983 rural and 33 city districts. The teachers numbered 1803, of whom 642 were men and 1161 were women. The average monthly salary in 1913 for women was $58.65; for men, $62.39. During the school year 1913–14 the sum of $42,768 was expended for maintaining a minimum school term of 100 days in remote districts. The total expenditures for elementary and high schools in 1913–14 was $1,346,402. There is a compulsory-education law, applicable to children between the ages of 7 and 14 years. Industrial education is in the hands of a State director. The total number of private and sectarian schools was 39, with 242 teachers and 5589 pupils. In 1914 there were 26 United States Indian schools, in which there were enrolled 2291 children. There are State normal schools at Las Vegas and Silver City. The institutions of collegiate rank are the University of New Mexico at Albuquerque, the School of Mines at Socorro, and the College of Agriculture and Mechanic Arts at State College—all State institutions and coeducational.

Charities and Corrections. The State charitable and correctional institutions include the Deaf and Dumb Asylum at Santa Fe, the Institute for the Blind at Alamogordo, the State Insane Asylum at Las Vegas, the New Mexico Reform School at Springer, the Miners Hospital at Raton, and the State Penitentiary at Santa Fe. Each of these institutions is governed by a separate board of directors.

Religion. Over 60 per cent of the population are Roman Catholics. The principal Protestant denominations in order of their numerical strength are Methodists, Presbyterians, and Baptists.

History. The first explorers of the region were Spanish. Cabeza de Vaca visited it in 1536 and Coronado (q.v.) in 1540–42. Espejo wandered over much of it in 1582–83. In 1598 Juan de Oñate conquered the inhabitants, who were Pueblo Indians, and not Aztecs, as often erroneously stated. Santa Fe was founded between 1605 and 1616. The Indians revolted about 1680, and kept their independence for 10 years. The mines were worked, and towns and missions were founded. This region became a province of Mexico when that country gained its independence of Spain in 1821. In June, 1846, Col. Stephen W. Kearny marched from Fort Leavenworth with a force composed of United States dragoons and Missouri volunteers, and occupied Santa Fe on August 18. The whole territory was declared a part of the United States. (See PRICE, STERLING.) The Territory of New Mexico formed a part of the Mexican cession by the Treaty of Guadalupe Hidalgo, Feb. 2, 1848. The Act of organization was passed Sept. 9, 1850, and went into effect in March, 1851. The original boundaries included that part of the territory of the United States north of the Mexican line, west of Texas, east of California, and south of 37°, including, however, the territory north of 37° and south of the Arkansas River. In 1853 the Gadsden Purchase (q.v.) was added, and Arizona was set off in 1863. The portion north of 37° was added to Colorado in 1867. During the Civil War New Mexico was invaded in December, 1861, by Texas rangers, who took possession of the Territory, but were forced to retire in April, 1862. In 1894 Congress passed an enabling Act, and in the Fifty-seventh Congress (1901–03) an Act of admission passed the House, but did not reach a vote in the Senate. In June, 1906, Congress passed a Bill providing for the admission of Arizona and New Mexico as one State, on condition that a majority of the electors in each Territory approve such union. At the election in November, 1906, a majority of New Mexico electors approved, but a majority of Arizona electors disapproved, thus leaving the Territorial status of each unchanged. In August, 1911, Congress passed a joint resolution admitting New Mexico as a State, and lastly in 1912 President Taft issued the tormal proclamation of statehood. On Nov. 7, 1911, in the first State election, William C. McDonald, Democrat, was elected Governor by a coalition of Democratic and Progressive Republican voters. The Legislature elected was, however, strongly Republican. This body, on March 27, 1912, elected Thomas B. Catron and Albert B. Fall United States Senators. Senator Fall drew the short term (one year), but at the end of that time he was elected to succeed himself. In the presidential election of 1912 Wilson received 20,437 votes, Taft 17,733, and Roosevelt 8347. In November, 1914, three constitutional amendments were carried—one reducing the terms of State and county officials from four to two years, another permitting such officials to succeed themselves, and the third eliminating the State Board of Equalization and repealing the clause on taxation. New Mexico has one Representative at large in Congress. The following have been Governors of the Territory and State of New Mexico:

TERRITORIAL

James S. Calhoun	1851–52
Edwin V. Sumner, U.S.A., commandant	1852
John Greiner, Secretary (acting)	1852
William C. Lane	1852–53
William S. Messery (acting)	1853–54
David Merriwether	1853–57
W. H. H. Davis (acting)	1854–57
Abraham Rencher	1857–61
Henry Connelly	1861–65
W. F. M. Arny (acting)	1865–66
Robert B. Mitchell	1866–69
William A. Pile	1869–71
Marsh Giddings	1871–75
William G. Ritch (acting)	1875
Samuel B. Axtell	1875–78
Lewis Wallace	1878–81
Lionel A. Sheldon	1881–85
Edmund G. Ross	1885–89
L. Bradford Prince	1889–93
W. L. Thornton	1893–97
Miguel A. Otero	1897–1906
Herbert J. Hagerman	1906–07
George Curry	1907–09
W. J. Mills	1909–11

STATE

William C. McDonald	Democrat	1911–

Bibliography. Brackenridge, *Early Discoveries by Spaniards in New Mexico* (Pittsburgh, 1857); McParlin, "Notes on the History and Climate of New Mexico," in *Smithsonian Report for 1877* (Washington, 1878); *The Resources of New Mexico* (Santa Fe, 1881); Ritch, *Aztlan: History, Resources, and Attractions of New Mexico* (6th ed., Boston, 1885); Bancroft, *Arizona and New Mexico* (San Francisco, 1888); Lummis, *The Land of Poco Tiempo* (New York, 1893); Schwatka, *In the Land of Cave and Cliff Dwellers* (ib., 1894); Frost, *New Mexico: Its Resources, Climate, Geography, etc.* (Santa Fe, 1894); Vernon Bailey, "Life Zones of New Mexico," *North American Fauna*, No. 35 (Washington, 1913); Wooton and Standley, "Flora of New Mexico," *United States National Herbarium, Contributions*, vol. xix (ib., 1915); Jones, *Mineral Resources of New Mexico* (Socorro, 1915).

NEW MEXICO, UNIVERSITY OF. An educational institution of higher learning at Albuquerque, N. Mex., incorporated by an Act of the Territorial Legislature in 1889 and indicated by statute as the future State university. The collegiate, normal, and preparatory departments were opened in 1892, and science, music, art, and commercial schools were afterward added. Later the commercial and preparatory schools were discontinued, the courses offered being strictly collegiate. The degrees of bachelor of arts and of pedagogy, of master of arts and of sciences, and of doctor of philosophy are conferred. The Hadley Climatological Laboratory, an organization for research, especially with reference to the influence of the climate of the arid and plateau region of the United States upon disease, was destroyed by fire in 1910, but the Legislature of 1915 appropriated certain sums to rebuild it. The students in 1915 numbered 132 and the faculty 21. The library contains about 12,000 volumes. The total value of the property under the control of the college in 1915 was $200,000. Its endowment consists of 243,000 acres of public lands and 150,000 acres of saline lands. The annual income for general maintenance is about $50,000. The president in 1915 was David K. Boyd, Ph.D.

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS. A coeducational State institution for higher education established at Mesilla Park, N. Mex., in 1889. It is chiefly supported by a State taxation and by the Morrill and Hatch funds of the United States government. The income from these sources amounts to about $90,000 annually. In 1914 the income from all sources was $130,000. The grounds and buildings were valued at $150,000 and the whole amount of college property at $200,000. The library contains about 16,500 volumes. The enrollment in the collegiate and special departments in 1915 was 103 and in the preparatory departments 143; the instructors numbered 53. The president in 1915 was George E. Ladd.

NEW MILFORD. A town, including several villages, and a county seat of Litchfield Co., Conn., 14 miles north of Danbury, on the Housatonic River and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, B 3). New Milford enjoys some popularity as a summer resort and has a public library. There are several large tobacco warehouses, also manufactories of hats, lime, furniture, dairy products, and paints. Pop., 1900, 4804; 1910, 5010.

NEW MODEL, THE. The name of the Parliamentary army in the great English Civil War, after its reorganization under the Ordinance of Feb. 15, 1645. The pattern was provided by Cromwell's Ironsides. There was no longer to be a division of responsibility, but all authority was concentrated in the hands of the new commander in chief, Lord Thomas Fairfax (q.v.). Cromwell became the lieutenant general. Parliament had freed the army from Essex and Manchester by the Self-Denying Ordinance (q.v.). Consult S. R. Gardiner, *History of the Great Civil War*, vol. i (London, 1886). See Cromwell, Oliver.

NEWNAN, nū′n*a*n. A city and the county seat of Coweta Co., Ga., 39 miles south by west of Atlanta, on the Atlanta and West Point and the Central of Georgia railroads (Map: Georgia, B 2). It is the centre of a productive fruit-growing and farming region, and has a large trade in cotton. The chief industrial establishments include canning and cigar factories, cotton and cottonseed-oil mills, foundries and machine shops, grain elevators, and manufactories of phosphates, fertilizers, boilers and tanks, etc. The city maintains a Carnegie library and has a fine courthouse building. The water works and electric-light plant are owned by the municipality. Pop., 1900, 3654; 1910, 5548.

NEWNES, nūnz, Sir George (1851–1910). An English editor and publisher, born in Derbyshire. His reading having suggested to him the value of a magazine containing "titbits of notes and fun," in 1881 he started a penny weekly, *Tit-Bits*, whose success brought him a large fortune. He founded the *Review of Reviews* (with W. T. Stead) in 1890 and the *Strand* in 1891, and at various times controlled, after establishment or purchase, the *Wide World*, the *Sunday Strand*, the *Captain*, *Fry's Magazine*, *Country Life*, the *Garden*, the *Ladies' Field*, *Woman's Life*, and the *Scholar's Own*. When W. W. Astor bought the *Pall Mall Gazette*, the only Liberal evening paper, and changed it into a Tory organ, Newnes immediately purchased the *Westminster Gazette*, took over the entire Liberal staff of the *Pall Mall*, and gave the Liberals an evening organ. Newnes was noted for his clever schemes to increase the circulation of his periodicals. He was a Liberal member of Parliament from 1885 to 1895 and from 1900 to 1910. In 1895 he was created Baronet. Consult the *Life* by Hilda Friedericks (New York, 1911).

NEW NETH′ERLAND. The original name of the Dutch colony afterward called New York.

NEWNHAM (nūn′*a*m) **COLLEGE.** An institution for the higher education of women, situated at Cambridge, England. It had its inception in the amalgamation in 1880 of the Association for Promoting the Higher Education of Women in Cambridge, organized in 1873, with the Newnham Hall Company, opened in 1875. As early as 1871 five women students came to Cambridge to study under the direction of Miss Clough, subsequently principal of Newnham College. This number increased to 25 by 1874. The growth of the college has continued steadily, and in 1902 it included North Hall, established in 1880; Clough Hall, 1888; the Pfeiffer Building, 1893; and the Kennedy Buildings, 1906. The library contains about 15,000 volumes. The attendance in 1912–13 was 222. The faculty included 4 fellows and 13 lecturers on the staff and 62 nonresident lecturers, of whom 26 were women. With certain restrictions the students have since 1881 enjoyed all the scholastic privileges offered at the University of Cambridge. Their names appear in the tripos or honor list in the university calendar. They do not, however, receive degrees, but are granted certificates.

NEW ORLEANS, ôr′lê-*a*nz. The largest city in Louisiana and, with the exception of Natchitoches, the oldest. It is situated on both banks of the Mississippi, 107 miles from its mouth and 72 miles in a direct line from the Gulf of Mexico, in lat. 29° 51′ 45″ N. (which is nearly the same as that of Cairo, Egypt) and long. 90° 4′ W. (Map: Louisiana, J 7). Its distance from Washington in direct line is 960 miles; from St. Louis by rail, 639; and from Chicago by rail, 923. The city proper occupies a strip of land between the river and Lake Pontchartrain, with the latter of which it is connected by two canals. The corporate limits of the city embrace the whole parish of Orleans, which includes a portion of the west bank, where is located the town of Algiers. The official boundaries thus inclose an area of almost 200 square miles, though the inhabited portion, located for the most part near the river's bank, covers only about 40 square miles. The city lies about 10 feet below the level of the Gulf, and is so far below the level of high water in the Mississippi that it is protected from overflows by levees 20 feet high in places. Its sobriquet, the Crescent City, is derived from the fact that the original city followed the curve of the river in front of the old Place d'Armes; but, as the inhabited portion has been gradually extended, its shape more nearly resembles the letter S. It has a frontage of more than 27 miles on both banks of the river, which is about ½ mile wide in front of Canal Street and from 40 to 200 feet deep.

Canal Street, 200 feet broad, is the great business thoroughfare, and cuts the city in two, the portion below being known as the French quarter, or Vieux Carré, and the portion above as the American quarter. The French portion, with its narrow streets, its occasional tiled roofs, its old cathedral, its Spanish city hall or cabildo, and its porte-cochères, is far more picturesque than the American quarter, which contains the great business houses, the banks, and also the handsomest private dwellings. In the French quarter, however, many beautiful residences, surrounded by flowers and semitropical plants, are to be seen on Esplanade Avenue. Here dwelt the old Creole families, descendants of the early French or Spanish settlers; here French is still spoken as a mother tongue, and, though there has been much intermarrying and social intercourse with Americans, French customs are still observed, and visitors feel as if they had happened upon a faubourg of Paris. French is taught in the public schools, and the French government supports schools for children of French parentage. Traces, also, of the Spanish régime are to be found in many interesting specimens of the Hispano-Moresque style of architecture, which, with the red-tiled Spanish houses and the exquisite ironwork of the balconies, make this portion of the city unique. Above Canal Street the principal residence streets are St. Charles Avenue and Prytania Street. These stretch for miles through the prettiest section of the city. Here are the most beautiful gardens. The palm, the palmetto, the fig, the orange, and the magnolia grow in tropical abundance, and even in winter the atmosphere is often perfumed with the odor of roses, violets, and sweet olive. The total extent of streets, which, owing to the curve of the river do not run at right angles, is about 820 miles. The lack of paving has made many of the streets almost impassable in bad weather and has had a tendency to congest traffic on the few streets that are paved. The street railways cover a total mileage of 225. A belt line extends around the most attractive portion of the city. There is also an electric line connecting with West End and Spanish Fort, suburban resorts in the vicinity. A recent and rapid development is the movement for occupation of the reclaimed lands on the shore of Lake Pontchartrain. Large tracts have been drained and are already dotted with commodious residences. On St. Charles Avenue many large apartment houses are being erected.

Climate. The Weather Bureau reports for the last 44 years show that the average rainfall is 56.95 inches. In winter there is generally some ice and occasionally snow. The summers are long, but the heat is seldom excessive, and prostrations are rare. The average annual relative humidity is 74 per cent. The large surrounding bodies of water render the climate more equable than in the interior. The annual mean temperature is 69° F. In 44 years the temperature has never reached 100° F. except in 1901 and 1909.

Buildings. The oldest building in the city of which the date of erection is certain, is the convent on Chartres Street, built for the Ursuline nuns in 1730. The cabildo, built in 1795, and the Presbytery, built in 1812 and standing north of the cabildo, are the only other buildings known to date back prior to 1820. The cabildo was built by the Spanish government, and in it the formal transfer of the Province of Louisiana from Spain to France and from France to the United States took place with elaborate ceremonies in 1803. Other notable structures are the Custom House, of massive granite, but not beautiful as to architecture; the Post Office, completed in 1910, at a cost of $1,657,000, situated on Lafayette Square; the City Hall, of Ionic order and modeled after a Greek temple; the Court House; the New St. Charles Hotel, one of the most famous hostelries in the South; Gibson Hall (a part of Tulane University); the Charity Hospital; the Medical College; the Milliken Memorial Hospital; the Touro Infirmary; the Harmony Club (an aristocratic Jewish association); the United States Mint; the Cotton Exchange; the Sugar Exchange; the Athenæum; the Jewish Orphans Home; and the new Tilton Memorial Library (also a portion of Tulane University). Among the splendid office buildings may be mentioned the Hennen Building, the Hibernia, the Liverpool and London and Globe, the Morris, Maison Blanche, the Masonic Temple, the Tulane-Newcomb, and the Canal Louisiana Bank Building. Of the ecclesiastical edifices the most prominent are the St. Louis Cathedral (Catholic), in which General Jackson attended services after his great victory at Chalmette in 1815; the archiepiscopal palace (1730), the oldest building in the Mississippi valley; the church of St. Anthony de Padua (Italian), formerly the mortuary chapel of the old St. Louis Cemetery; the church of the Immaculate Conception, St. Joseph's Church, the First Presbyterian, Christ Church Cathedral (Episcopal), Trinity Church, St. Paul's, Temple Sinai, the Prytania Street Church (Presbyterian), the Coliseum Place Church (Baptist), and the new Touro Synagogue on St. Charles Avenue.

Parks. The total park area of the city is about 742.66 acres. The two largest and most interesting parks are the City Park and Audubon Park, which are both being rapidly improved. City Park, which is situated on Metairie Road, between the city and the lake, contains 216 acres (partly water). It was formerly a plantation, and beneath its ancient oaks, draped with festoons of Spanish moss, occurred nearly all the famous duels which were a marked feature of Creole life before the Civil War. Dueling has now passed away. In this park young men find amusement in golf and polo. Portions of it are still wild. Audubon Park, in the upper portion of the city, contains 249 acres, and was also a plantation in days gone by. It was here that, in 1796, the first successful attempt was made by Etienne de Boré to granulate sugar—marking an epoch in the industrial history of the State. Its superb live oaks, its miniature lakes, and its great greenhouse, 300 feet long and full of rare tropical plants, make this park a favorite resort. It also contains an interesting sugar-experiment station, supported by the State. Besides these parks, there are two squares that attract attention on account of historical associations. These are Beauregard Square and Jackson Square. The former was in old times the resort of the slaves, and here they assembled for their wild dances to the sound of bones and drums. Jackson Square was not only associated with the exciting events that occurred in connection with the two transfers of the province in 1803, but was also the scene of the triumphal entry into the city of General Jackson after the battle of New Orleans. The square contains a fine equestrian statue of General Jackson by Clark Mills. Flanked by the old cathedral and the court buildings on one side and by the fine Pontalba rows on two of the other sides, this square is regarded as one of the most symmetrical and beautiful public places in the United States. Near by is the French market, which is one of the sights of New Orleans. The city's beauty has been enhanced greatly by the efforts of the parking commissioners, who have planted fine shade trees on many of the thoroughfares.

Cemeteries. There are a number of cemeteries in various portions of the city. The most interesting are the Roman Catholic cemeteries, of which the oldest is St. Louis No. 1, and the most curious is St. Roch's Campo Santo. The handsomest cemetery is the Metairie, which contains, among its fine monuments, the tomb of the Army of Tennessee, surmounted by the splendid equestrian statue of Gen. Albert Sidney Johnston. As it is not possible in New Orleans to dig much below the surface without finding water, the curious custom prevails of burying in vaults, or ovens, rising in tiers sometimes 8 feet above the ground line. Jews, however, bury beneath the ground, as do some of the poorer classes. At Chalmette, near by, there is a national cemetery which contains the graves of about 12,000 Unionists. It was here that the battle of New Orleans was fought in 1815. On All Saints' Day (November 1), which is a general holiday in the city, the Roman Catholics visit the cemeteries and decorate the tombs of the dead.

Libraries. While New Orleans has no such enormous libraries as are found in some of the Northern cities, it is fortunate in possessing several of importance. A subscription library was established by the first Legislature of the Territory of Orleans and has continued in existence ever since. In 1851 its books were collected in the city hall, whence they were removed in 1896 to form the nucleus of the present public library, which is housed in a handsome building near Lee Circle, provided by Andrew Carnegie. It has four branches and embraces the Fisk, Hernsheim, and Lyceum libraries. Across the Circle is the splendid building of the Howard Memorial Library, designed by H. H. Richardson. It is a privately endowed institution, and contains only reference books, including the largest collection of works on Louisiana and the Mississippi valley in existence. Other large libraries are the State Library and the Tilton Memorial Library of Tulane University. Among the smaller ones of a quasi-public character should be mentioned those owned by the Jesuits' College, the Tulane Medical College, the Parish Medical Society, the New Orleans Bar Association, and the H. Sophie Newcomb Memorial College. There are also in the city three private libraries containing valuable collections of original documents on American history. In the Howard Memorial Hall are a number of interesting relics of the Civil War.

Charitable Institutions. The city is rich in charitable institutions. The principal one is the Charity Hospital, built in 1832 and occupying a magnificent site on Tulane Avenue. It treats about 30,000 patients every year without charge. It is supported by State appropriation and is controlled by a board appointed by the Governor. The city supports a home for aged and infirm, a house of refuge for boys, and an insane asylum. There are also an eye, ear, nose, and throat hospital, maintained by private contributions, the Presbyterian Hospital, and Hôtel Dieu (Roman Catholic). The Jews have several well-organized charitable institutions, among which the principal are the Jewish Orphans Home and the Home for Aged and Infirm Jews. The Touro Infirmary, endowed by a wealthy Hebrew philanthropist, has a free clinic, where the poor of all sects are treated. The charitable institutions under the control of Roman Catholics are the Poydras Asylum, the New Orleans Female Orphan Asylum, St. Vincent's Infant Asylum, and the House of the Good Shepherd. There are for colored people a boys' home and a home for the aged, founded by a colored philanthropist. Another noteworthy institution is the Kingsley House, modeled after the famous Hull House of Chicago. It is supported by private subscriptions. Finally, the Charity Organization Society, now known as the Federation of Nonsectarian Charities, has undertaken to organize the many charities of the city and by the careful investigation of its agents to prevent pauperization.

Educational Institutions. The organization of the public-school system is thorough and complete. The oldest educational institution is that conducted by the Ursuline sisters since 1730. Their convent, after two removals, occupies a fine building in the upper portion of the city. A large number of the handsome schoolhouses of the city were built from the income of a fund given by a former citizen, John McDonogh. The city makes such appropriations for the public schools as it thinks proper, but it cannot appropriate less than eight-tenths of a mill for any one year. Besides this appropriation it receives its share of the current school fund collected by the State. There are no mixed schools. The system comprises 88 schools and is controlled by an elected school board. The enrollment in day and evening schools in 1914 was 47,867, while the teaching corps numbered 1350. The buildings are valued at more than $4,000,000. The Delgado Central Trade School Fund, recently bequeathed to the city, will amount to almost $900,000. The total cost of maintaining the schools in 1914 was $1,201,378. Free instruction is also given to young children by several kindergartens, supported partly by churches and partly by private funds. There are also a number of private schools in the city for whites and for negroes. Among the most prominent colleges may be mentioned the College of the Immaculate Conception (established by the Jesuit fathers in 1847), the Soulé Commercial and Literary Institute (established 1856), Spencer's Business College and Institute of Shorthand (established 1897), and the Home Institute (established in 1883). For the education of the colored youth there are four universities, or more properly colleges: Leland University (1870), Straight University (1870), New Orleans University (1873), and the Southern University (1881). Only the last of these is supported by the funds of the State. For the whites there is only one university, the Tulane University of Louisiana (q.v.), with the H. Sophie Newcomb Memorial College for Women, opened in 1886.

Amusements. New Orleans is famous for its French opera. For 40 years before the Civil War troupes were brought over from France to furnish this entertainment, and with brief intervals the custom has prevailed ever since. The French Opera House was erected by the architect James Gallier in 1859. Such is the passion for music and singing, especially among the Creoles, that even in times of great financial depression the city has managed by private subscription to support these foreign companies. No other city in the Union has shown equal enthusiasm. Thousands of visitors are attracted to the city during the winter season by the opera; but a still greater attraction for many years has been the Carnival celebration. As early as 1840 tableaux on floats were drawn through the streets, and, except during the Civil War, the custom has continued to the present day. These superb pageants are now given by four secret organizations—Momus, Proteus, Rex, and Comus—and each is followed at night by a gorgeous ball. Other secret organizations have sprung into being of late years, and the series of masked balls now extends with brief intervals from Twelfth Night to Mardi Gras, or Shrove Tuesday. When the morning of Ash Wednesday dawns every vestige of this prolonged revelry has vanished. The subjects represented in the parades are drawn from mythology, romance, and history. The floats are designed by artists of established reputation, who, with their assistants, spend many months in elaborating them. The expense of these parades is about $200,000 a year. Nowhere else in the world are similar pageants to be seen. Ample provision has also been made for outdoor recreation. Along the lake shore, the popular resorts, Spanish Fort and West End, have been enlarged and beautified, and attractive forms of entertainment are provided in the summer. Frequent excursion trains and steamers are run from the city to the various watering places on the lake and the Gulf.

Clubs. The principal social clubs of New Orleans are the Boston, the Pickwick, the Chess, Checkers and Whist, the Harmony, the Louisiana, the Era (a women's club), the Round Table, the Variété, and the Southern Yacht Club. The Louisiana Historical Society devotes itself to the investigation and preservation of the history of the State, while the Athénée Louisianais was founded for the study and preservation of the French language.

Drainage and Sewerage. The surface of the city being entirely flat, with the exception of Metairie Ridge, which has an elevation of about 2 feet, the problem of drainage and sewerage has been a perplexing one ever since the founding of New Orleans. The average rainfall being 57 inches, tropical downpours are not infrequent, and they sometimes flooded the principal streets to the depth of several feet. Furthermore, strong winds often forced the waters of Lake Pontchartrain over the rear of the city and kept it submerged for several days. Various plans for draining the city were tried, but they all failed. Finally the city appropriated for this purpose a large amount of money derived from the sale of street-railway franchises, and under a drainage board appointed in 1896 the immense work of digging canals and establishing pumping stations was begun. Both the sewerage and drainage systems are now complete. About 375 miles of sewer pipe have been laid, and two main pumping stations and five substations have been built at an approximate total cost of $5,500,000. The drainage system, operating over an area from the Mississippi River to Lake Pontchartrain, was installed at a cost of almost $15,000,000, and includes 103 miles of canals. As a result of these operations, the water level has been lowered considerably, so that buildings can be constructed with cellars. The use of long cypress piles and reënforced-concrete foundations has made possible the erection of buildings of 12 stories. The waterworks plant is one of the finest in the country and one of the largest of its type in the world. It comprises two pumping stations of 80,000,000 gallons' capacity, while across the river there is a 4,000,000-gallon independent system. There are 500 miles of distribution mains and pipes, and active filtration was begun in 1909. The cost of the water works and filtration plant was $7,000,000.

Health. New Orleans has always been subject, at intervals, to visitations of yellow fever, and its sanitary reputation has been thereby seriously impaired. Before the Civil War the worst epidemics were those of 1832, when more than 8000 out of a population of about 55,000 died of yellow fever and cholera; of 1847, when nearly 2500 died of yellow fever alone; and of 1853—the Great Epidemic—when fully 16,000 died from yellow fever and other causes. In 1878 there was one which carried off 4000 persons in Louisiana. In 1882, however, a thorough system of disinfecting vessels was established at the mouth of the Mississippi, and for 15 years the fever was kept outside the boundaries of the State. In 1897 it was again introduced from a town in a neighboring State, where the disease had prevailed for some time without being recognized. In that year, according to the official report, there were in Louisiana 1935 cases, most of them in New Orleans, but the total number of deaths was only 306. In the two subsequent years the disease appeared again, but still in a very mild form and with a low rate of mortality. In 1853 the death rate per 1000 of the population from yellow fever alone was 50.9; in 1854, 15.4; in 1878, 19.20; in 1897, 1.90; in 1898, 0.20; in 1899, only 0.07. In the latter part of May, 1905, the fever was again introduced, either from Havana or Colon, but not recognized until July 21. It had gained much headway and threatened to assume the proportions of the 1878 visitation. The new doctrine of mosquito transmission was applied, but the local authorities were not prepared to meet the emergency, so the United States Marine Hospital Service was placed in temporary charge, and citizens raised $150,000, the State contributed $60,000, and the city $60,000, to prosecute the campaign. (This was the first application of the doctrine of killing mosquitoes to stamp out yellow fever.) Up to August 10 there had been two more deaths than during the same period in 1878. Then the disease was brought under control, and gradually stamped out two months before frost, with a total record in New Orleans of 3395 cases and 460 deaths. In 1906, for the first time in the history of yellow fever, there was not a recrudescence. Sanitary laws have been revised, the principal provision being that all cisterns, tanks, and water containers must be screened. Pools, ponds, and other water containers which cannot be screened must be oiled periodically. The activities of the city health board have greatly improved the milk supply, and the rat-proofing campaign in 1914, conducted by the United States health authorities, caused the destruction of many of the unsightly small buildings which long defaced the city streets.

Industry and Commerce. As a manufacturing centre, New Orleans has many advantages, among which may be mentioned the following: the climate is moist enough for cotton manufacture and favorable for continuous labor throughout the year; the raw materials need but short transportation; the laboring class is numerous and contented; fuel is brought cheaply by water; and the exporting facilities are excellent. The chief industries are rice cleaning and sugar refining, roasting and grinding of coffee and spice, printing and publishing, and the manufacturing of distilled and malt liquors, bags, illuminating gas, copper, tin, and sheet-iron products, foundry and machine-shop products, boots and shoes, furniture, men's clothing, cotton goods, tobacco, cigars and cigarettes, cottonseed oil, alcohol, and planing-mill products. The census bulletin (1909) gives the number of wage earners in all industries as 20,938, the total wages paid as $8,020,060, and the value of the total output as $78,794,030. There were then in the city 848 manufacturing enterprises, with a total capital of $56,934,000. The United States government has constructed at New Orleans one of the largest floating dry docks in the world. This has shown its ability to lift and sustain some of the largest ships in the American navy. Eight great railroad lines have a terminus here. These are the Southern Pacific, Illinois Central, Louisville and Nashville, Texas and Pacific, Southern, the Queen and Crescent, the Louisiana Railway and Navigation

Company, and the Rock Island-Frisco system. There are six great grain elevators along the docks, which are for the most part covered with steel sheds and extend for 8 miles along the left bank. As the gateway of the Mississippi valley, the city is well situated for foreign commerce. The South Pass jetties at the mouth of the river give a channel of about 30 feet, and the depth of the river in front of the city is ample for the largest vessels. Direct lines of steamships connect with New York, the West Indies, Central America, and Europe, and there is even a direct line via the Suez Canal to Japanese ports, carrying raw cotton for manufacture. The commerce of New Orleans developed slowly, being hindered for the first hundred years by government restrictions. With its cession to the United States, the effect of the immense product of the Mississippi valley, hampered for 10 years by Spanish control of the river's mouth, was felt immediately. The commerce of the city improved vastly and, assisted by the presence of large banking companies, soon grew to immense proportions. To-day each of the great staples has its special exchange. The centre of the cotton market is the handsome exchange building on Carondelet Street. In 1914 it handled 1,370,765 bales, nearly 9 per cent of the total crop. Sugar has its exchange built near the levee, on which are hauled large quantities of sugar and molasses produced by the riverside plantations. Nearly 583,000,000 pounds passed through the hands of New Orleans merchants in 1914. Rice is sold to the Board of Trade, the approximate value of the sales for 1914 being $6,625,000. The lumber trade in 1913 amounted to 368,000,000 feet. In that year the city imported $82,399,100 worth of merchandise, while its exports, in which New Orleans ranks third in the country, amounted to $169,980,277.

Government. New Orleans was incorporated in 1804, and its government was reorganized successively in 1852, 1870, 1882, 1896, and 1898. Then, under an Act passed by the Legislature in 1912, the city was placed under the commission form of government, composed of the mayor, who is the commissioner of public affairs, and commissioners of public finance, public safety, public utilities, and public property. These are all elected for a period of four years. Besides the numerous city courts, the State Supreme Court, the United States District, the Circuit Court, and the Circuit Court of Appeals hold sessions in New Orleans. Of late, the police department has undergone vast improvement. Efficient action has been taken to enforce the law against white slavery, that controlling the liquor traffic, and that against lotteries. The practice of the Recorders' Courts has been much improved, and the establishment of a Night Court has allowed of speedy justice being meted out for minor offenses.

Finance. The total indebtedness of the city in 1913 was $44,167,875 and the assessed valuation of real and personal property $235,564,586. The rate of taxation was 22 mills, consisting of city expense tax, 10 mills; interest and redemption city bonds, 10 mills; special tax for water, sewerage, and drainage, 2 mills. To this tax of 22 mills should be added the State tax of 6 mills and the tax of 1 mill for the maintenance of levees, making the total rate 29 mills. There is a voluntary poll tax of $1, devoted to the support of public schools. New Orleans expended in 1913 about $17,000,000, of which sum $4,486,000 was for maintenance and operation, the chief items being $1,153,155 for education, $393,000 for police department, $505,000 for fire department, $753,000 for sanitation, and $214,000 for the water-supply system. The city's income in that year was $16,569,000.

Population. The population of New Orleans has always been of a decidedly cosmopolitan character. Its first inhabitants were the Canadian associates of Iberville and the servants and soldiers of his company, drawn from all parts of France and Switzerland. John Law's concession on the Arkansas attracted vast numbers from the Rhine valley. A small portion arrived to start a valuable German colony; Nova Scotia sent hundreds of Acadians. With the Spanish domination came an infusion of colonists from Spain and her subject islands, and the troubles of Santo Domingo brought thousands of Spanish refugees. The census of 1910 gave New Orleans a population of 339,075, making it the fifteenth largest city in the United States. There were 27,686 persons of foreign birth and 89,262 negroes. Of the former, about 8000 were Italians, 6000 German, 3600 French, and 3000 Irish. The increase in population is shown as follows: 1870, 191,418; 1880, 216,090; 1890, 242,039; 1900, 287,104; 1910, 339,075; 1914 (U. S. est.), 361,221.

History. New Orleans was laid out in 1718 by Jean Baptiste Le Moyne, Sieur de Bienville, then Governor of Louisiana, and it was named in honor of the Duke of Orléans, Regent of France. The centre of the new settlement was the old Place d'Armes, now called Jackson Square. In 1722, when New Orleans became the capital of the French territory in this vicinity, its low, marshy site was visited by Père Charlevoix, who records in his journal that he found only 100 barrack-like buildings, with a large wooden storehouse, and "two or three residences that would be no ornament to a village in France." With prophetic eye, however, he added: "I have a well-grounded hope that this wild and desert place, which the reeds and trees do yet almost wholly cover, will be one day—and perhaps that day is not far distant—an opulent city and the metropolis of a great and rich colony." In November, 1762, France ceded the whole of Louisiana to Spain, but the people in New Orleans, who first heard of the transaction in 1764, strenuously objected to the change and forcibly expelled the first Spanish Governor, who came in 1766. In 1769 Alexander O'Reilly (q.v.), who had just been appointed Governor of Louisiana, punished with unsparing severity those who had been prominent in the uprising. In the same year the census taken by Governor O'Reilly shows that the city possessed only 468 houses, with a population of 3191. Of these the free persons numbered 1901, the slaves 1230, and the domesticated Indians 60. During the rest of the Spanish period there was but slow growth, perhaps on account of the burdensome commercial restrictions of the Spanish régime. During the American Revolution New Orleans was the headquarters of the Spanish forces on the North American continent and the place from which a number of expeditions were sent out by Governor Bernardo Galvez (q.v.) against the British. In 1800, by the secret treaty of San Ildefonso (q.v.), Louisiana was retroceded to France, but the French government did not take formal possession until

Nov. 30, 1803, just 20 days before American deputies came to take possession for the United States in pursuance of the Louisiana Purchase. By this year the population had increased to a little over 8000. In 1802 the products shipped from New Orleans consisted of flour, 50,000 pounds; tobacco, 2000 hogsheads; cotton, 34,000 bales. Some 5000 casks of rum were produced in the distilleries around the city, but the manufactures were mostly confined to cordage, hair powder, vermicelli, and shot.

As for the government during the French and Spanish régime, the whole province was nominally in the hands of a Superior Council, which was a judicial body and theoretically a legislative one. In truth, however, this body, which was appointive, not elective, had very little power. All laws for Louisiana were made in France. There was no self-government under either the French or the Spanish. Under the Spanish a Cabildo (assembly) was substituted for the Superior Council. It was composed of six perpetual regidores, two ordinary alcaldes, an attorney-general syndic, and a clerk. The Governor presided. By a curious provision, the offices of regidor and clerk were obtained by purchase, and in the first instance at auction. The ordinary alcaldes and the attorney were elected annually by the Cabildo. The ordinary alcaldes were judges within the city for criminal and civil cases. The regidores were the standard bearer, the high sheriff, the receiver of fines, etc. There was an appeal from this tribunal to the Captain General of Cuba, and from him to the Royal Audience in Santo Domingo, and thence to the Council of the Indies in Madrid. As under the French, the laws were issued by the Governor in the name of the King. Even the police regulations were issued by the same official.

In 1804, the year after the United States obtained possession, President Jefferson said that "the position of New Orleans certainly destines it to be the greatest city the world has ever seen"; but the growth for many years, though rapid, did not come up to the general expectations. In 1805 New Orleans was regularly incorporated, and the inhabitants elected a city council. This was the first occasion on which the right of public suffrage was ever exercised in Louisiana. Americans now crowded into the newly acquired city. In the winter of 1806–07 wild rumors were abroad that Burr intended to make New Orleans the capital of a new empire. The city was placed under martial law by General Wilkinson, and it was some time before the excitement subsided.

A great impetus to the prosperity of the city was given in 1812, when the first steamboat arrived from Pittsburgh. The Mississippi was now to become a great highway of commerce, and New Orleans was to flourish accordingly. Growth was checked for a time by the war with Great Britain, which followed soon. When, however, General Jackson won his great victory at Chalmette in 1815 (see New Orleans, Battle of), attention was speedily directed to the city that he had saved, and its population increased more rapidly than ever before. By 1830 it had risen to 46,000, and in 1840 to 102,000. The city was extended beyond its old boundaries, gas and other improvements were introduced, and a more cosmopolitan spirit began to appear. In 1837 the city became involved in the speculative mania of the day and suffered severely from the ensuing panic. Nothing, however, could permanently check the prosperity of New Orleans, not even the terrible ravages of yellow fever, which in the decade before the Civil War were more fatal than ever before. In 1836 the Creoles were so little in accord with the Americans that a novel form of government was tried. The city was divided into three municipalities, each with a recorder and a council of aldermen. There were a mayor and a general council (embracing the councils of the different municipalities) to control the affairs of general interest, but each municipality could tax itself and manage its local affairs. This anomalous state of things continued until 1852. In 1849 the State capital was transferred to Baton Rouge, but later New Orleans was again for a time the capital (1868–80).

In the Civil War New Orleans was an important centre of Confederate military and commercial operations until captured by a Federal fleet under Admiral Farragut in April, 1862. (See Fort Jackson.) Thereafter it proved an important strategic point for attacks upon other parts of the Confederacy. Under the administration of Gen. B. F. Butler (q.v.), which lasted from May to December, 1862, the city suffered the extreme rigor of martial law. Butler's successor, Gen. N. P. Banks, was far more conciliatory. During the period of reconstruction New Orleans was the headquarters of the politicians and of the carpetbaggers, who, with their freedmen allies, governed the State during the stormy period. In 1866 there was a serious riot at Mechanics' Institute (now Tulane Hall), in which a constitutional convention was broken up by the Democrats and a number of persons killed. In 1874 the Republican Governor, William Pitt Kellogg, fearing an uprising of the people, denied the inhabitants the right to bear arms, and whenever arms were found on any person they were seized by the police. The White League, a Democratic organization, determined to procure arms at all hazards. Arms were ordered by steamer from the North, and when the steamer arrived at the levee, the League, arming itself as best it could, marched down to the dock on Canal Street to receive them. Here a conflict was precipitated with the metropolitan police of the Governor. The police were scattered, and the artillery which they had placed upon the levee was turned against themselves. The White Leaguers lost 16 men. Seventeen years later a monument was erected to their memory on the spot where they fell. While an appeal to the President once more restored the Governor to power, this affair of Sept. 14, 1874, is generally regarded as the beginning of the end of reconstruction in Louisiana. In 1877 the United States troops were withdrawn, and with them the carpetbag rule disappeared. With a free government restored, the city turned its attention to the development of its great opportunities, and steady progress has marked its subsequent history. In 1884 a Cotton Centennial Exposition was held here—the first bale of cotton exported from the United States having been shipped from Charleston in 1784. In 1880 the capital of the State was removed from New Orleans. In 1891 nine Italians, members of the Mafia (q.v.), who had been arrested for the murder of the chief of police, David C. Hennessy, were lynched by a mob, after being acquitted by the courts. This gave rise to considerable controversy between the United States and the Italian governments.

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NEW ORLEANS, Battle of. The last battle of the War of 1812 between the United States and Great Britain, fought at Chalmette, near New Orleans, La., Jan. 8, 1815. On Dec. 10, 1814, a British fleet of more than 50 sail with about 7000 troops on board arrived off the eastern coast of Louisiana and came to anchor near the entrance to Lake Borgne. Twelve days later a division of the troops, by the aid of treacherous Spanish fishermen, made its way up Bayou Bienvenu, and on the afternoon of the twenty-third reached the right bank of the Mississippi, some eight miles below New Orleans. A few hours later the Americans, who for some weeks had, under the leadership of Maj. Gen. Andrew Jackson, been preparing to resist the invasion, made a night attack upon the division and inflicted considerable loss, but did not succeed in overwhelming it. Next morning General Jackson fell back behind an old disused mill race that stretched across the strip of solid ground from the river to a cypress swamp, and there threw up a breastwork. This breastwork was composed chiefly of earth, and not of cotton bales, as was once believed; as a matter of fact, 277 bales were originally used in the embrasures of some of the batteries and in building a magazine. On New Year's Day Maj. Gen. Sir Edward Pakenham, who had now arrived with reënforcements and taken command of the English, attempted to batter down the American lines by a cannonade; but this attempt failed, and he then decided to try an assault. The plan he adopted was for Lieutenant Colonel Thornton to cross the river and storm an American battery on the right bank, while on the left bank two columns were to assault the American main position. The assault was made on the morning of Jan. 8, 1815. On the left bank the British attacked with spirit, but were met with such a heavy cannonade and with such a storm of bullets from the rifles of the American troops, mainly backwoodsmen from Tennessee and Kentucky, that in less than half an hour about 2000 men, including Major Generals Pakenham, Gibbs, and Keane, were shot down, and the assault failed. The American loss in this main engagement was but 8 killed and 13 wounded. On the right bank Thornton was successful, but, owing to the defeat of the main army, was unable to follow up his advantage. Ten days later the British retreated to their ships. Although the battle was fought after the Treaty of Ghent (q.v.) had been signed, it had results of importance. It was, says the historian Schouler, the only battle of the war that made an impression on Europe, and it served also to help quicken the yet feeble sense of American nationality. By giving a sunset glow of success to an otherwise somewhat inglorious war, it greatly strengthened the position of the administration and hastened the "deathbed scene of the Federalist party." It saved the mouth of the Mississippi from conquest; it gave the Western people, who had won it without much help from the seaboard, the confidence to assert a greater influence in national affairs. Most important of all, it made General Jackson, who had displayed military talents of a high order, the idol of the American people, and was an important factor in causing his subsequent elevation to the presidency.

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NEW ORLEANS UNIVERSITY. An institution for higher education in New Orleans, La., chartered in 1873. It is one of the systems of schools managed by the Freedmen's Aid Society of the Methodist Episcopal church for the education of negroes. The university includes an academic department, the Sarah Goodridge High School, the Nurses' Training School, and the Gilbert Industrial College. (The last-named department is at Baldwin, La.) There were in all departments in 1915 about 800 students and 40 teachers. The university has 10 departments —the college, college preparatory, normal grades, music, domestic science, domestic arts, commercial, oratory, night school. The library has about 3000 volumes. The president in 1915 was Charles M. Melden.

NEW PHIL'ADEL'PHIA. A city and the county seat of Tuscarawas Co., Ohio, 96 miles by rail south of Cleveland, on the Tuscarawas River, the Ohio Canal, and the Baltimore and Ohio and the Pennsylvania railroads (Map: Ohio, H 4). There are mining interests and manufactures of steel, canned goods, roofing tile, sewer pipe, bricks, vacuum cleaners, stovepipes, carriages, flour, brooms, and pressed, stamped, and enameled goods. Coal and clay are found in the vicinity. The principal attractions of the city are Tuscora Park, the public library, county poor farm and jail, orphans' home, Union Hospital, courthouse and high-school buildings, and Schoenbrun Springs. Settled in 1805, New Philadelphia was first incorporated three years later. The government is vested in a mayor, who holds office for two years, and a unicameral council. Pop., 1900, 6213; 1910, 8542; 1914 (U. S. est.), 9470.

NEW PHIL'IPPINES. Another name for the Caroline Islands (q.v.).

NEW PLYM'OUTH. The capital and seaport of Taranaki, North Island, New Zealand, on the west coast, 120 miles southwest of Auckland (Map: New Zealand, N. I., A 6). It has an extensive harbor and is a terminal of railway lines to Wellington and Napier. It is the centre of a rich cereal-growing district and a mart for the dairy produce of the neighborhood, which is largely exported, and the town contains flourishing leather works and flour mills. Pop., 1906, 5141. Consult *Australasian Yearbook* (Melbourne, 1906).

NEW POM'ERA'NIA (Ger. *Neu Pommern*), formerly New Britain. The largest island of the Bismarck Archipelago in Melanesia. It lies 50 miles from the northeast coast of New Guinea and stretches east and northward in a narrow crescent, 300 miles long and 90 miles in greatest breadth, but in several places contracted to a strip only a few miles wide (Map: Australasia, H 3). Its area is about 9500 square miles. The interior is still but little known; it is mountainous, with several active or half-extinct volcanoes in the northeastern part, one of which has an altitude of 3600 feet, while in the west extremity Hunstein Mountain reaches a height of 6000 feet. The rainfall on the island is abundant, and the vegetation is luxuriant, the interior being covered with immense forests reaching to the summits of the mountains, while the coastal districts are very fertile. The natives, whose numbers are unknown, are Melanesian savages with marked language differences. Except for a few traders who lead precarious existences at various places along the shores, the scanty European population is concentrated at Herbertshöhe, on St. George's Channel. Several valuable plantation properties have been established in the coast lands of the eastern face of the Gazelle Peninsula. For history, see Bismarck Archipelago.

NEW'PORT. A market town, river port, and county borough in Monmouthshire, England, 20 miles southwest of Monmouth, on the Usk, 4 miles from the Bristol Channel and 12 miles northeast of Cardiff (Map: England, D 5). It has a Norman church on a hill, a twelfth-century castle, a monastery, a town hall, county offices, a market house, a museum, and an art gallery. It has brass and iron foundries, breweries, and pottery works, and manufactures of telegraph, railway, and ship supplies and wagons, India rubber, gutta percha, chemicals, nails, wire, fertilizers, glass, and pottery. Iron ships are also built here, and there is an extensive cattle trade. The dock accommodation covers 80 acres, and the town has an important shipping trade in coal, iron, timber, and grain. Its imports in 1911 amounted to 1,703,794 tons; exports, 2,292,584 tons. The municipality owns much real estate, the water works, electric-lighting plant, tramways, baths, slaughterhouses, markets, cemeteries, cottage allotments, an isolation hospital, and a fire brigade. The town is first mentioned at the beginning of the tenth century, and received its first charter from Edward II. The towers and the central mass remain of the castle, built about 1130 by Robert, Earl of Gloucester. Pop., 1901, 67,290; 1911, 83,691.

NEWPORT. A municipal borough, chief town of the Isle of Wight, England, situated near the centre of the island, on the Medina (Map: England, E 6). It is the commercial centre of supply for the island, has breweries, cement factories, and trade in timber, malt, wheat, and flour. St. Thomas's Church, founded in 1854, is a handsome edifice and contains a monument erected by Queen Victoria to the Princess Elizabeth, daughter of Charles I. Its grammar school, founded in 1612, was the scene of negotiations between Charles I and the Parliament. The guildhall, corn exchange, and museum are among the interesting features. The town, already favored with charters and privileges, was incorporated by James I in 1607. It owns the water supply and markets. Pop., 1901, 10,911; 1911, 11,154.

NEWPORT. A city and the county seat of Jackson Co., Ark., 84 miles by rail northeast of Little Rock, on the navigable White River and on the Chicago, Rock Island, and Pacific and the St. Louis, Iron Mountain, and Southern railroads (Map: Arkansas, D 2). It is situated in the cotton belt of northeastern Arkansas and has important commercial and manufacturing interests, the chief industrial plants being cotton, oil, and lumber mills, a foundry, and veneering, stave, and handle factories. Pop., 1900, 2866; 1910, 3557.

NEWPORT. A city in Campbell Co., Ky., at the junction of the Ohio and Licking rivers, which separate it from Cincinnati, Ohio, and Covington, Ky., and on the Chesapeake and Ohio and the Louisville and Nashville railroads (Map: Kentucky, F 1). There are bridges across both rivers, and the cities of Cincinnati, Newport, and Covington are connected by electric railroad, the Kentucky cities being popular as places of residence for Cincinnati business men. A few miles distant, in the hills back of Newport, is the United States military post, Fort Thomas. Newport has a city park and a public library, the library building ranking with other prominent edifices of the city—the courthouse, municipal building, and in addition the post office, Masonic Temple, and Newport and German national banks. The chief manufactured products are watchcases, sheet iron, rails, screens, pianos, and carriage supplies. There are also large iron-roofing and lithographing plants and a brewery. Settled about 1791, Newport was incorporated in 1795 as a town and in 1850 received a city charter. The commission form of government has been adopted. Pop., 1900, 28,301; 1910, 30,309; 1914 (U. S. est.), 31,517.

NEWPORT. A town and the county seat of Sullivan Co., N. H., 43 miles by rail west-northwest of Concord, on the Sugar River and on the Boston and Maine Railroad (Map: New Hampshire, E 6). The town is of considerable importance as a summer resort and contains the Carrie F. Wright Memorial Hospital and the Richards Library and Museum. The Corbin Blue Mountain Forest Park, comprising 22,000 acres, is 5 miles distant. Newport has extensive manufactures of flannels, cotton underwear, shoes, agricultural implements, and lumber products. The water works are owned by the city. Pop., 1900, 3126; 1910, 3765. Consult Wheeler, *The History of Newport, N. H.* (Concord, 1879).

NEWPORT. A city, port of entry, county seat of Newport County, and until 1900 a capital of Rhode Island; in Narragansett Bay, about 30 miles south of Providence, on the New York, New Haven, and Hartford Railroad (Map: Rhode Island, C 4). It has regular steamboat communication with Wickford, Providence, and New York and is a favorite resort of people of wealth, whose costly residences are in the newer part of the town. In the older part the houses are small and quaint and the streets narrow.

The town was settled in 1639 by William Coddington, John Clarke, and others, who left Boston on account of their sympathy with the Antinomians and purchased from the Indians in 1638 Aquidneck, now the island of Rhode Island. Newport is charmingly situated on a hill sloping westward to the harbor, which is defended by Forts Adams and Greble and gives safe anchorage to the largest vessels. The torpedo station of the United States government is on Goat Island, the naval training station and war college on Coasters' Harbor, and the naval hospital on Rhode Island. Among Newport's natural attractions are Easton's and Bailey's beaches; Cliff Walk; Ocean Drive; the Spouting Rock; Purgatory, a deep chasm in the rocks; and the Hanging Rocks, where Dean Berkeley wrote part of *Alciphron* during his sojourn (1728–31) at Whitehall, his country seat near by. There are many historic buildings. The present Court House was originally a State House, ordered built in 1738 and used as a hospital during the Revolution. From its balcony the Declaration of Independence was read (1776), and in its Senate Chamber is the Gilbert Stuart portrait of Washington. Peter Harrison designed the old market house in 1763, long used as a city hall; the Redwood Library, whose collection of books was started in 1747 by Abraham Redwood; and the Jewish synagogue, dedicated in 1763.

The Vernon house, headquarters of Rochambeau, and visited in 1781 by General Washington, is now owned and occupied by the Charity Organization Society. The Bannister house, headquarters of the British general Prescott; the Gibbs mansion, once occupied by Gen. Nathanael Greene; the old White Horse Tavern; the last residence of Com. Oliver Hazard Perry, now owned by the Salvation Army; the birthplace of Com. Matthew C. Perry and that of Rev. William Ellery Channing (now the Children's Home), are of great historic interest. There are many monuments and parks, among them the Mall in Washington Square, about which much of the life of the town was once centred. Up this square were dragged the boats of the British sloop *Liberty*, whose destruction, 1769, was one of the first acts of resistance to British authority. Touro Park contains the Old Stone Mill, long attributed to the Norsemen, but mentioned (1677) in the will of Gov. Benedict Arnold as "my stone built windmill."

Before the Revolution, Newport was commercially and industrially important, but during the British occupation (1776–79), 480 buildings were destroyed, wharves used for fuel, and churches—except Trinity (1726) and also the Seventh Day Baptist meetinghouse (1729)—for riding schools and stables. The town records were carried off and almost entirely destroyed in a wreck at Hell Gate, and the dilapidated remains, returned to Newport at the close of the war, are being arranged and restored under the care of the Newport Historical Society. The town was depopulated and business prostrated by the war. Newport is governed by a charter, adopted 1906, which provides for a mayor, a board of five aldermen, and a representative council of 195. It was incorporated from 1784 to 1787 and again in 1853, and from its settlement had a good town government. Under the 1643 charter it was united with Providence, Portsmouth, and Warwick; and in 1663 Rev. John Clarke, of Newport, was instrumental in securing from King Charles II the charter under which the State of Rhode Island and Providence Plantations was governed until 1843. A public school was established in 1640, and in 1710 there was a Latin school in the little town schoolhouse. To-day, besides the public schools, are St. George's and Cloyne House School. In 1727 James Franklin (brother of Benjamin) was printing in Newport; in 1732 he published the first newspaper, the Rhode Island *Gazette;* and in 1758 his son James founded the *Mercury*, a weekly paper, still published. The Redwood Library and the People's Library are still flourishing, and the Newport Historical Society has a good collection of books, manuscripts, and relics relating to Newport history. Pop., 1900, 22,034; 1910, 27,149; 1915, 30,472. Consult: S. G. Arnold, *History of the State of Rhode Island* (2 vols., New York, 1859–60); *Rhode Island Colonial Records; Newport Historical Magazine;* G. W. Mason, *Reminiscences of Newport* (Newport, 1884); E. M. Stone, *Our French Allies* (Providence, 1884).

NEWPORT. A village and the county seat of Orleans Co., Vt., 49 miles north by east of Montpelier, on Lake Memphremagog and on the Canadian Pacific and the Boston and Maine railroads (Map: Vermont, E 2). It has the Goodrich Memorial Library (public) and a Federal building containing the post office and customhouse, and is a well-known summer resort. The village is surrounded by a farming region. There are some manufactures. The water works are owned by the village. Pop., 1900, 1874; 1910, 3684.

NEWPORT, CHRISTOPHER (c.1565–1617). An English navigator. In 1591 he started on a voyage from London as captain of the *Golden Dragon*, with three other ships, on an expedition to the West Indies. After pillaging four Spanish towns and capturing or sinking 20 Spanish merchantmen, the expedition turned back across the Atlantic laden with spoil. At Flores they joined Sir John Burgh and took part with him in the capture of the *Madre de Dios*, Aug. 3, 1592. In 1606 Newport commanded the fleet of three ships which conveyed John Smith and his fellow colonists to Virginia. He spent some time in Virginia, and took part in an exploring expedition up the James River with Smith. In 1607–08 he made another voyage to Virginia, and in 1609 commanded the first expedition sent out under the second charter, which conveyed Sir Thomas Gates and Sir George Somers to Virginia. Newport's ship, the *Sea Venture*, was cast ashore on the Bermudas, whence the colonists proceeded to Virginia in a small pinnace, which they constructed from the wrecked ship. In 1611 he made a last voyage to Virginia. The wreck of the *Sea Venture* and the description of the Bermudas contained in a book published by Silvester Jourdain in 1610 are said to have suggested some of the scenes and characters in Shakespeare's *Tempest*. In the year following he entered the service of the East India Company. Between 1613 and 1617 he made four voyages to India for the company, finally dying at Bantam of a fever. An account of his voyages to America, entitled *Newport's Discoveries in Virginia* and purporting to have been written by "a gentleman of the colony," was published in the *Archæologia Americana*, vol. iv (Boston, 1860).

NEWPORT, GEORGE (1803–54). An English naturalist and physician, born at Canterbury and educated at London University and at the College of Surgeons. He was one of the most skilled anatomists of his time, and his researches on the structure of insects and other arthropods are very important. His publications include: *On the Respiration of Insects* (1836); *Observations on the Anatomy, Habits, and Economy of the Turnip Fly* (1838); article on "Insecta" in Todd's *Cyclopedia of Anatomy and Physiology* (1839); *On the Use of Antennæ of Insects* (1840); *List of Specimens of Myriopoda in the British Museum* (1844); *Monograph of the Class Myriopoda, Order Chilopoda* (1845); and *On the Impregnation of the Ovum in the Amphibia* (1851), his most original and valuable work, for which he received the royal medal of the Royal Society.

NEWPORT NEWS. A city and port of entry in Warwick Co., Va., 12 miles north by west of Norfolk and 75 miles by rail southeast of Richmond, on the James River and Hampton Roads, and the terminus of the Chesapeake and Ohio Railroad (Map: Virginia, H 5). It has also several coastwise and five foreign steamship lines. A fine harbor and excellent shipping facilities have made Newport News the centre of large commercial interests, its foreign trade in merchandise (1915) being valued at $72,786,472, including exports to the amount of $70,286,491. Its industrial interests, too, are well developed. There is here one of the largest shipyards in the world, employing at times as many as 10,000 men and having three dry docks, 585, 639, and 861 feet in length; also two grain elevators, lumber mills, iron works, and coal wharves. Among the noteworthy features of the city are the customhouse, Warwick Park, the group of county buildings, and the Warwick Hotel. Casino Park, on the James River, is a popular resort. Settled in 1619, Newport News was incorporated first in 1896. Pop., 1900, 19,635; 1910, 20,205; 1914 (U. S. est.), 20,446.

NEW PROV'IDENCE. The most important, although one of the smallest, of the Bahama Islands. It is situated between Eleuthera and Andros islands, 170 miles from the southeast coast of Florida (Map: West Indies, C 1). Area, 58 square miles. Pop., 1901, 12,534; 1911, 13,554. In physical features it resembles the other Bahamas (q.v.), but it alone has a good harbor, and on it is the town of Nassau (q.v.), the capital of the islands. The first English settlement in the Bahamas was founded on New Providence in 1629.

NEW RED SANDSTONE. A large series of reddish-colored loams, shales, and sandstones, occurring between the Carboniferous and the Middle Triassic formations, were grouped together under this name, in contradistinction to the Old Red Sandstone group, which lies below the coal measures and has a similar mineral structure. It has been found, however, that two very distinct periods were included under this name; and the contained fossils of each group were found to be so remarkably different that the one period was referred to the Paleozoic system, under the name of Permian (q.v.), while the other was determined to belong to the Triassic system (q.v.). The name is no longer used in the United States.

NEW RIVER. A river of West Virginia. See KANAWHA RIVER.

NEW ROCHELLE, rō-shĕl'. A city in Westchester Co., N. Y., 16½ miles from the Grand Central Station, New York City, on an arm of Long Island Sound and on the New York, New Haven, and Hartford and the New York, Westchester, and Boston railroads (Map: New York, Insert, B 2). It is a popular residential suburb of New York, and has a reputation as a summer resort. There are many handsome residences, and several spacious Colonial mansions dating from the Dutch and English periods. An Ursuline seminary now occupies Leland Castle, which is known for its fine interior decorations. The city has a public library, a home for the aged, high school, hospital, fine courthouse buildings, several public, private, and parochial schools, a city park, and yachting, tennis, golf, and rowing clubs. New Rochelle was settled in 1688 by Huguenots, some of whom were natives of La Rochelle. It was the home for several years of Thomas Paine, to whose memory a monument has been erected. There are manufactories of scales and speedometers. Pop., 1900, 14,720; 1910, 28,867; 1915, 31,754.

NEW ROSS. A town and urban district lying mainly in County Wexford and partly in Kilkenny, Ireland, on the Barrow River, 20 miles west-northwest of Wexford (Map: Ireland, E 7). An iron bridge with a draw connects the suburb of Rosbercon on the Kilkenny side. Ships of 600 tons can unload at its quays at all stages of the tide. There are exports of agricultural produce. A fine grade of rose point lace is manufactured, and there are salmon fisheries. Although believed to date from the sixth century, the history of New Ross begins with the erection of the old monastery in the thirteenth century. Cromwell captured the town in 1649 and destroyed its walls and fortresses, of which there are fragmentary remains. Pop., 1901, 5847; 1911, 5547.

NEWRY, nū'rĭ. A river port, market town, and parliamentary borough in County Down, Ulster, Ireland, 63 miles north of Dublin (Map: Ireland, E 3). It is traversed by the Newry Water, which is crossed by five bridges and falls into Carlingford Lough, and by a canal, by which navigation is prolonged to Lough Neagh, a distance of 32 miles. Newry is also connected by the Newry Canal with Victoria Lock. The town is handsomely and compactly built. The quays are lined with spacious warehouses, and there are several tanyards, rope and sail works, coach, car, and agricultural-machinery factories, iron foundries, grain, flour, and spinning mills. It exports grain, eggs, linen, and cloth, and imports coal and timber. There are large granite quarries in the neighborhood. Extensive water works have been constructed. Steam vessels ply to Liverpool and Glasgow from Warrenpoint, a port 5 miles distant on Carlingford Lough. The town is nearly contemporaneous with the English invasion, having grown up around a monastery, founded in 1183, and a castle subsequently erected by De Courcey. This castle was the scene of several struggles, and in most of the civil wars of Ulster Newry suffered severely. It was incorporated as a borough by James I, and sent two members to Parliament. The corporation was abolished by the Irish Municipal Reform Act, and the affairs of the town are now administered by 21 commissioners. Pop., 1901, 12,405; 1911, 11,963.

NEW SALLEE, sȧ-lā'. A seaport of Morocco. See RABAT.

NEW SARUM. See SALISBURY.

NEW SCHOOL OF MEDICINE. See ECLECTIC SCHOOL OF MEDICINE.

NEW SCHOOL PRESBYTERIANS. See Presbyterianism.

NEW SIBE'RIA, or Liakhov, **ISLANDS.** A group of islands in the Arctic Ocean, situated north of east Siberia, between lat. 73° 9′ and 77° 30′ N. and long. 136° 16′ and 159° 6′ E. (Map: Asia, Q 1). The principal islands of the group are Kotelnoi, 116 by 100 miles in area, New Siberia, 90 by 40 miles, and Liakhov. Kotelnoi has mountains 1200 feet high, but the others rise rarely above 300 feet. In the main the group is treeless, with ample vegetation for innumerable lemmings, foxes, bears, and herds of reindeer pursued by wolves from the Lena region. Its vast deposits of the Tertiary and Post-Tertiary periods of ivory-bearing animals, principally the mammoth, have made it for nearly two centuries the resort of hunters. The group was discovered by Vaghin, who visited Bolshoi in 1711, followed by Liakhov, who reached New Siberia and made the group known to the world in 1770. Sannikov, in his visit to Kotelnoi in 1805, saw Sannikov Land to the north. (See Sannikov Land.) Bjelkov added the islands named for him, and another group was discovered by De Long (q.v.) in 1880–81 and named for him. Vilkitski (q.v.) added two small islands to the De Long group in 1913–14. Hedenstrom's researches of 1811 made known the remarkable Tertiary deposits, which researches in recent years have been greatly supplemented by Bunge and Toll (1885–86), Toll and Shileiko (1893), and by Toll (q.v.) and Seeberg (1900–02). Consult Emma Toll, *Die Russische Polarfahrt der Sarja* (Berlin, 1909).

NEW SOUTH SHETLAND ISLANDS. See South Shetland Islands.

NEW SOUTH WALES. A state of Australia, situated in the southeastern part of the continent and bounded on the north by Queensland, on the east by the Pacific Ocean, on the south by Victoria, and on the west by South Australia (Map: New South Wales). Its area, 310,372 square miles, is more than five times that of England and Wales, much larger than that of any of the United States, and more than twice that of the State of California. The federal territory of approximately 900 square miles, for the site of the capital, Yass-Canberra, was acquired from New South Wales in 1910.

Physical Features. The Great Dividing Range runs along the coast in an irregular system of broken minor ranges, whose main axis extends about 100 miles inland. It is known as the Australian Alps in the south, the Blue Mountains near the centre, and the New England Range in the north. These mountains are broken by deep ravines and cañons. The Blue Mountains are especially rugged and abrupt and long formed an impassable barrier. The highest point is Mount Kosciusko, near the south boundary, with an altitude of 7350 feet. The mountains are flanked on the west by a broad, undulating plateau, which sinks gradually towards the great plains of the west, but rises again in the northwest corner of the state to a height of 2000 feet in the Stanley and Grey ranges. The coast is bold and rocky and indented by a number of small inlets, among which Port Jackson, the harbor of Sydney, forms one of the finest harbors in the world. The rivers on the east slope of the Dividing Range are small, the largest being the Hawkesbury, with a length of 330 miles. On the west slope the Murray River forms a part of the south boundary of the state, and its two great tributaries, the Darling and the Lachlan, course through the western plains.

Climate. Owing to the vast extent and diversity of elevation, the temperature varies from the coldest to be met with in the British Isles to the genial warmth of the Mediterranean, and choice may be made of a climate either dry or moist, hot or cold, but everywhere coupled with a marked salubrity. Sydney, the metropolis, has a mean temperature of 63° F., and these figures may be fairly taken as representing the average temperature of the state. While parts of the mountains during the winter are clothed with snow, which occasionally carpets the high lands of the middle districts also, Sydney has not been visited with a measurable fall since 1836, but slight frosts are usual in the winter at nights; and the neighborhood of the north coast rivers, again, enjoys a moist and balmy atmosphere suggestive of tropic lands. The extreme of heat, however, is felt inland, where temperatures of 130° F. have been reported. During more than half the year the climate is delightful. Dry seasons come at uncertain intervals, but the settlement of the interior by building a multitude of reservoirs for preserving the abundant rains has increased the low-water stages of the rivers, and artesian wells have been bored for getting water from below, so that droughts are no longer feared as they formerly were. The flora and fauna partake of the general character of eastern Australia. See Australia.

Geology and Minerals. The mountain and plateau regions consist mainly of Paleozoic rocks, Silurian in the south, Carboniferous in the central portion, and Devonian in the north, while the northeastern and southeastern coast districts are overlaid with lower Mesozoic strata. There are considerable outcrops of granites and metamorphic rocks in the higher regions, with dikes of volcanic trap, basalt, and greenstone. The great plains are formed by horizontal strata of Cretaceous and Tertiary sandstone, sands, and gravel. Rich and extensive coal beds cover large areas in the state. Gold exists in quartz veins in the Silurian rocks, and silver, tin, copper, iron, and precious stones are also found.

Mining. Commercially mining is next to grazing in importance. The first Australian gold was mined in New South Wales, and for a long period the annual production of gold exceeded that of any other mineral in the state. There were many fluctuations in output, but since 1905 a gradual decline has been noted. Almost at the beginning the output was largest, the record year being 1852, when gold production reached a value of £2,660,946. The value had fallen to £573,582 in 1881, being surpassed by the coal output, valued at £603,248. Gold production reached £1,156,715 in 1894 and £1,165,013 in 1905; after the latter date it declined to £702,129 in 1912. The development of silver and silver-lead mining, from about 1884, increased rapidly, especially in the Broken Hill district, so that these metals have long exceeded gold in importance. The value of silver, silver-lead, and silver-lead ore produced in the state in 1912 is reported at £3,481,266. Copper production was valued at £227,667 in 1881 and £579,791 in 1912; in the latter year the copper amounted to 8990 tons, besides 2044 tons of ore. The tin output was valued at £568,795 in 1881; there was an enormous decline in the next 10 years, but in 1911 the output increased to £307,089 and in 1912 to £338,074; the latter figure represented

900 tons of ingots and 1175 tons of ore. The production of zinc, confined practically to the Broken Hill district, is more important than that of copper or tin; in 1889, 97 tons of spelter and concentrates were produced and, in 1912, 520,518 tons, valued at £1,766,242. The state has large deposits of coal. The coal output in 1891 was 5,968,426 tons, valued at £2,178,929; in 1905, 6,632,138 tons, valued at £2,003,461; in 1912, 9,885,815 tons, valued at £3,660,015. New South Wales produces by far the greater part of Australian coal, iron, lead, silver, tin (outside of Tasmania), zinc, platinum, and opal. The total value of minerals produced in 1912 is reported at £11,226,602; total value recorded to the end of that year, £227,372,627. Value of the principal minerals produced in 1912 and, in parenthesis, the total value recorded to the end of that year: coal, £3,660,015 (£69,087,688); silver and lead, £3,481,266 (£60,221,900); gold, £702,129 (£59,-462,975); copper, £579,791 (£11,784,102); tin, £338,074 (£9,327,609); zinc, £1,766,242 (£7,539,-913); iron, £130,708; opal, £35,008.

Agriculture. Agriculture is increasing in importance, but is still subsidiary to stock raising. The soil is generally of great fertility, but the scantiness and uncertainty of the rainfall prevent it from being tilled in the great regions west of the mountain ranges. The unfavorable climatic conditions are most severe on the far western plains. In the coast district and on the table-lands and the western slope of the table-lands a considerable area is cultivated. Although the possibilities of fruit culture are great, the industry in general has not made any considerable progress. Oranges and grapes, however, receive no little attention. The remoteness from the world's markets has tended to limit the production of all agricultural products. The area under crop, excluding permanent artificially sown grasses, steadily increased from 629,180 acres in 1880–01 to 3,737,085 in 1912–13. The percentage of area under crop to total area was 1.887. By far the most important crop is wheat, whose acreage was 59.69 per cent of the area under crop. In 1913–14 the acreage under principal crops was as follows: wheat, 3,205,197; hay, 534,226; corn, 156,820; green forage, 154,272; oats, 103,516; fruit, 49,329; potatoes, 38,728. Wheat production in 1913–14 was 38,020,381 bushels, or 11.9 bushels per acre.

Stock Raising. The extensive area of grassed lands and the mildness of the winters are greatly favorable to grazing, which is the most characteristic industry of the state. It should be noted that, in addition to the area under crop stated in the preceding paragraph, New South Wales had, in 1912–13, 1,152,399 acres under artificially sown grasses. The table shows the number of live stock at various dates, with the percentage in 1912 on the total for the Commonwealth:

YEAR	Horses	Cattle	Sheep	Swine
1860............	251,497	2,408,586	6,119,163	......
1870............	337,597	2,195,096	16,308,585	......
1880............	395,984	2,580,040	35,398,121	......
1890............	444,163	2,091,229	55,986,431	......
1900............	481,417	1,983,116	40,020,506	......
1910............	650,636	3,140,307	45,560,969	321,632
1912............	714,952	3,033,726	38,855,861	293,450
1912, per cent....	29.69	26.20	46.67	34.72

Of the total number of cattle in 1912, 852,040 were dairy cows. New South Wales has always been the chief sheep-producing state, with the exception of a short period in the early sixties, when Victoria held first place; and the number of sheep in the state was more than half that in the Commonwealth in every year from 1878 to 1912, excepting the latter year and 1902, 1908, 1910, and 1911. The maximum number, 61,831,-416, was reached in 1891. Estimated wool production in 1912–13, 326,804,000 pounds. Much of the grazing land is owned by the state and is leased to the occupants under liberal conditions.

Manufactures. Manufacturing steadily gains in importance. The number of manufactories increased from 3476 in 1903 to 5162 in 1912. The average number of persons employed increased from 89,098 in 1908 to 115,561 in 1912 (88,238 males, 27,383 females). In the latter year the total value of plants and machinery was £13,795,195; total wages paid, £11,600,124; value of output, £61,163,328.

Communications. The settled parts are well provided with means of communication. The approximate length of roads in 1913 was 94,796 miles, of which the roads that were metaled, ballasted, graveled, etc., totaled 16,447 miles. The four principal main roads are roughly contiguous to the four government-owned railway lines.

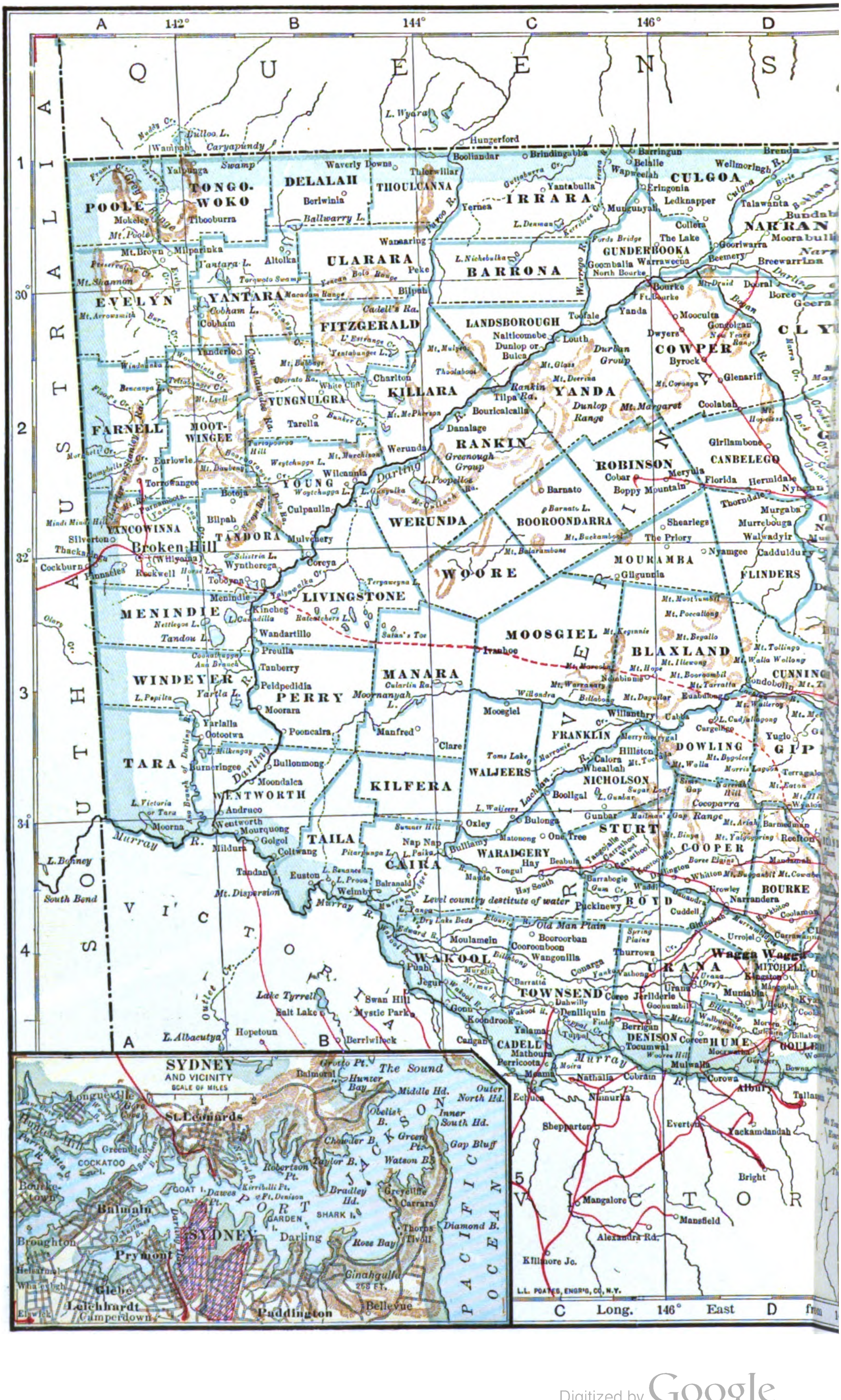
The length of railway open to traffic increased from 14 miles in 1855 to 1040 in 1881, 2926 in 1901, 4027 in 1911, and 4197 in 1913. Of the total in 1913, 3930 miles were government-owned railway (4 foot 8½ inch gauge), 153½ miles were private lines available for general traffic, and 113½ miles were private lines used for special purposes only. The gross earnings for the year 1912–13 were £6,748,985 and the working expenses £4,644,881. Tramways open in 1913, 212 miles, of which all but 4 miles were controlled by the government.

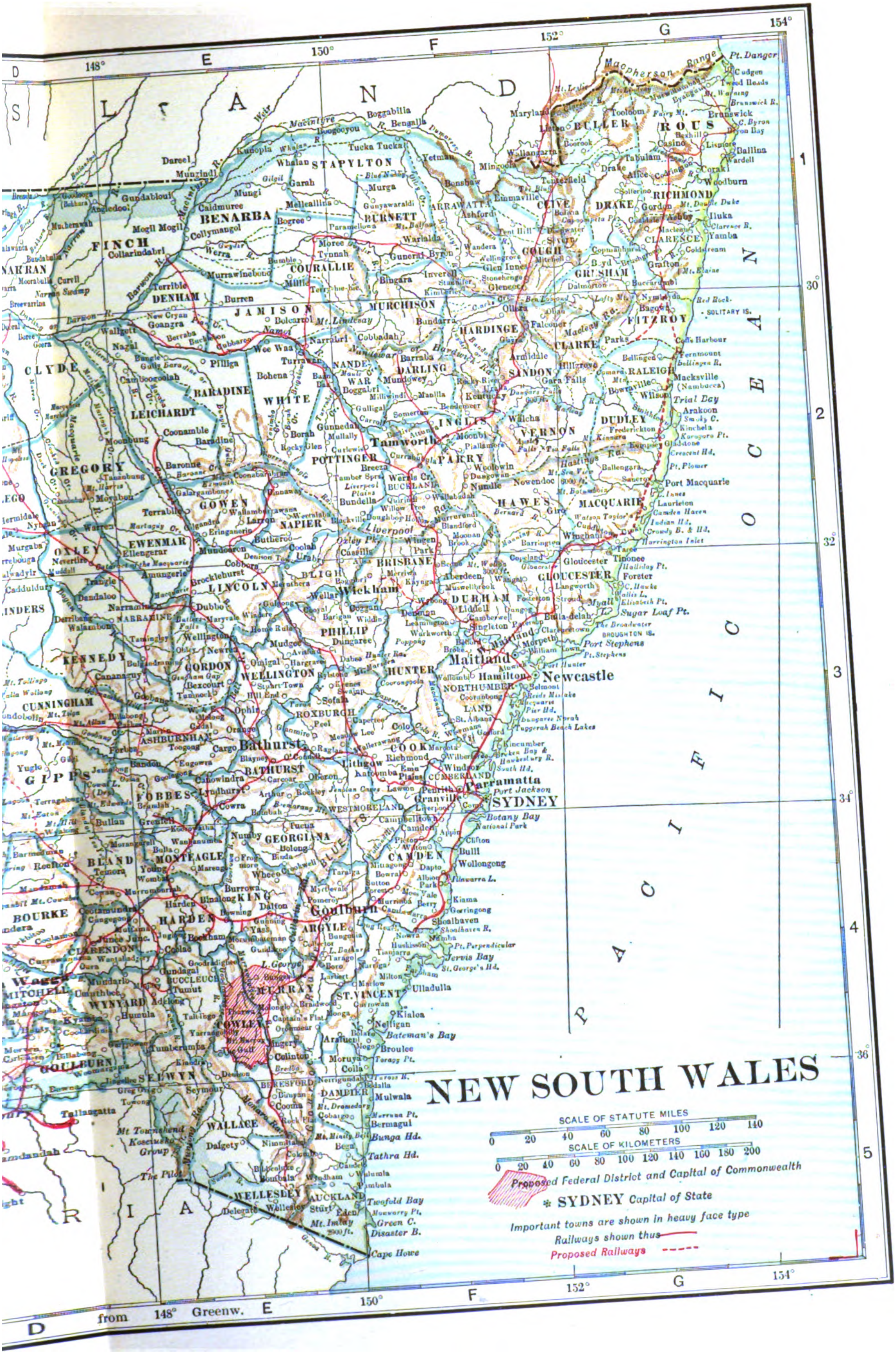
At the end of 1912 post offices numbered 2000 and telegraph offices (exclusive of railway telegraphs) 1384, with 18,348 miles of line and 32,042 of wire.

Commerce. The following table shows the value of imports and exports, discriminating the trade with the United Kingdom, with other British colonies and possessions (exclusive of other Australian states), and with other countries:

YEAR	U. K.	Other Brit.	Other	Total
		Imports		
1910....	£14,385,633	£3,240,358	£5,613,002	£23,238,993
1911....	15,740,509	4,284,573	7,318,346	27,343,428
1912....	18,093,957	4,970,893	9,238,780	32,303,630
		Exports		
1910....	£13,318,099	£3,081,387	£15,635,965	£32,035,351
1911....	12,261,971	5,830,179	14,069,251	32,161,401
1912....	10,316,918	6,096,078	16,545,533	32,958,529

The principal export is wool, which by weight, in 1912–13, was 45 per cent of the total for the Commonwealth. Value in 1912 of leading exports of domestic produce to countries outside of Australia: wool, £11,496,850; gold bullion and coin, £3,044,157; copper, £2,310,322; hides and skins, £1,907,231; wheat, £1,619,107; meats, £1,327,342; coal and coke, £1,153,943. The total tonnage (including interstate) entered and cleared at the ports increased from 8,728,144 in


A
142°
B
144°
C
146°
D
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
1
2
3
4
5
30°
32°
34°
POOLE
TONGO-WOKO
DELALAH
THOULCANNA
IRRARA
CULGOA
NARRAN
ULARARA
BARRONA
GUNDERBOOKA
EVELYN
YANTARA
FITZGERALD
LANDSBOROUGH
COWPER
YUNGNULGRA
KILLARA
YANDA
FARNELL
MOOTWINGEE
RANKIN
ROBINSON
CANBELEGO
YOUNG
WERUNDA
BOOROONDARRA
YANCOWINNA
TANDORA
WOORE
MOURAMBA
FLINDERS
LIVINGSTONE
MENINDIE
MOOSGIEL
BLAXLAND
CUNNINGHAM
WINDEYER
MANARA
PERRY
FRANKLIN
DOWLING
GIPPS
TARA
KILFERA
WALJEERS
NICHOLSON
WENTWORTH
TAILA
STURT
COOPER
CAIRA
WARADGERY
BOYD
BOURKE
WAKOOL
URANA
WAGGA WAGGA
MITCHELL
TOWNSEND
DENISON
HUME
CADELL
GOULBURN
Broken Hill
Bourke
Cobar
Wilcannia
Menindie
Wentworth
Ivanhoe
Hay
Balranald
Deniliquin
Albury
Murray R.
Darling R.
Level country destitute of water
SYDNEY AND VICINITY
SCALE OF MILES
PORT JACKSON
PACIFIC OCEAN
SYDNEY
St. Leonards
Balmain
Pyrmont
Glebe
Paddington
L.L. POATES, ENGR'G. CO., N.Y.
C
Long.
146°
East
D
from


NEW SOUTH WALES
SCALE OF STATUTE MILES
0 20 40 60 80 100 120 140
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Proposed Federal District and Capital of Commonwealth
* SYDNEY Capital of State
Important towns are shown in heavy face type
Railways shown thus
Proposed Railways
PACIFIC OCEAN
SYDNEY
Newcastle
Maitland
Parramatta
Bathurst
Goulburn
Tamworth
Wickham
148° 150° 152° 154°
30° 32° 34° 36°
D E F G
1 2 3 4 5
from 148° Greenw.

1902 to 12,080,235 in 1907 and 14,943,051 in 1912; British tonnage in 1912, 11,983,698.

Government and Finance. The executive authority rests with a governor appointed by the crown and assisted by a responsible ministry. The legislative power is vested in a parliament of two houses, the Legislative Council and the Legislative Assembly. The Council consists of not less than 21 members (59 in 1914) appointed by the crown for life. The Assembly consists of 90 elected members, each representing one electoral district. The maximum duration of a parliament is three years. The suffrage is exercised by natural-born or naturalized British subjects who have resided six months in the Commonwealth, three months in the state, and one month in the electoral district. The franchise was extended to women in 1902 and was exercised for the first time at a state election in 1904. Of the 75 members of the federal House of Representatives, 27 are from New South Wales.

Revenue and expenditure in years ended June 30 have been as follows: in 1903, £11,296,069 and £11,467,235; in 1908, £13,960,763 and £12,095,593; in 1913, £16,057,298 and £16,798,500; in 1914, £18,298,625 and £17,702,851. In 1913 public works and services provided 63 per cent of the revenue, Commonwealth subsidy 13.57, land 11.43, taxation 8.75, and miscellaneous sources 3.25. Of the £1,405,360 derived from taxation, £662,625 represented the income and dividend tax and £365,250 the probate and succession duties. Of the £10,116,827 derived from public works and services, £8,544,376 were from railways and tramways. Of the state's expenditure in 1912–13, 38.04 per cent (£6,390,420) was the working expenses of railways and tramways, 23.74 public debt, 8.91 education, 3.83 medical and charitable, 3.29 police, 2.01 justice, 0.53 penal establishments, and 19.65 all other. The public debt June 30, 1913, was £106,170,747; sinking fund, £381,893; net indebtedness per capita, £58 9s. 2d.

Population. In 1800 the estimated population, exclusive of aboriginals, was 5217; in 1860, 348,546; in 1870, 497,992; in 1880, 741,142; in 1890, 1,113,275; in 1900, 1,360,305; in 1910, 1,643,855; in 1912, 1,777,534. The census of April 3, 1911, returned 1,646,734 inhabitants (857,698 males, 789,036 females), exclusive of full-blooded aboriginals. Of the foreign-born population, by far the greater number were born in the United Kingdom. There were also recorded civilized or semicivilized aboriginals to the number of 2012 (this figure not included in the total for the state); the total number of full-blooded aboriginals in New South Wales is probably not above 7000. Crude birth rate in 1902, 27,23; in 1907, 27.34; in 1912, 29.86. Of the births in 1912, 5.6 per cent were illegitimate.

In 1911 Sydney, the capital, with its suburbs, had 629,503 inhabitants (38.19 per cent of the population of the state); the population of the local government area Sydney was 112,921 and of the locality Sydney 107,133. The population of a locality is the number of persons who returned themselves as belonging to that locality. The following figures are for localities at the 1911 census: Balmain, 31,961; Broken Hill, 30,953; Glebe, 21,444; Leichhardt, 24,139; Marrickville, 25,993; Newtown, 26,427; Paddington, 24,150; Petersham, 20,407; Redfern, 24,275; Sydney, North, 32,764; Parramatta, 12,520; Goulburn, 10,187; Botany, 10,228; Annandale, 11,250; Bathurst, 9219; Maitland, West, 7395; Wagga Wagga, 7446; Tamworth, 7607.

Religion. The 1911 census returned the population in respect of religion as follows: Christian, 1,594,329; non-Christian, 12,773. Anglicans numbered 734,000, Roman Catholics 413,013, Presbyterians 182,911, Methodists 151,274, Congregationalists 22,655, Baptists 20,679, Jews 7660, Salvation Army 7413, Lutherans 7087.

Education. Instruction is free and, between the ages of 6 and 14, compulsory. A new system of secondary instruction came into operation in 1911, and in 1912 a law was enacted coördinating the entire system so that it is now possible for a child to pass gratuitously through the various stages from kindergarten to university. In 1912 there were 3234 state schools with 6454 teachers, an enrollment of 235,803, and an average attendance of 171,028. Total net cost in 1912, £1,572,932. Private schools in 1912 numbered 754, with 3673 teachers, an enrollment of 61,744, and an average attendance of 51,168. In 1912 the University of Sydney had 29 professors, 101 lecturers, and 1107 matriculated and 388 nonmatriculated students. The 1911 census returned 1,379,631 persons able to read and write, 6442 able to read only, and 260,661 unable to read; of those unable to read, the great majority were children under school age.

History. See AUSTRALIA; AUSTRALIAN FEDERATION.

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NEWS′PAPER. A public print issued at periodical intervals, sold at a fixed price per copy and for a definite period to regular readers known as subscribers, and giving three classes of information: (*a*) relating to events, or news; (*b*) opinions, or editorials; and (*c*) to wares on sale, or advertisements.

These three factors in the newspaper spring from three desires and demands present in every community, however primitive. The first is information on current events, distributed today in Eastern market places by men (the Italian *coranto* prior to printing) known and sought for the knowledge they have and obtain from merchants, wanderers, and gossip, so that news passes over wide Oriental areas with amazing rapidity, the story-teller often sandwiching news between his tales. The second is current opinion, expressed in villages by elders who sit in the market place and found in larger communities in places where men are wont to gather, as mosque, temple, and mart. The third is the proclamation of wares, which begins with an emblem, passes to a lettered sign, particularly in China, and earlier or later is part of the task of the public crier. The most isolated village, the most inchoate confederacy of tribes, the most primitive area, has these three needs met in some fashion.

Historically these needs pass first by word of mouth. They are next written and distributed by copying. Lastly the printing press multiplies the copies and develops systematic distribution, but it does not change the essential character of the earlier demand and supply. In all these stages, from the wandering village gossip, story-teller, and messenger to the power press, newspaper train, and carrier, this machinery expresses a social need and meets a demand whose satisfaction is necessary to organized society. Those who satisfy this need and demand are engaged, not in self-expression, but in the service and expression of that share of human society whose want and desire they meet. This fact broadly differentiates the often confused aim, attitude, and office of the newspaper man from those of the author.

This fundamental characteristic of the newspaper brings it into organic relations with society and renders definition by statute necessary in a sense not demanded of books or other publications nonperiodic in character.

These definitions arise from the social relations of the newspaper, as to the desire of despotic governments to control, or of other governments to regulate, its utterances, of the subscriber or advertiser to assume a proprietary right and to express a personal relation to its policy, whether by approval or disapproval, and of libel laws to define by statute and judicial decision the responsibilities and obligations of the newspaper for its utterances on public men and officers. (See LIBEL.) In the United States this definition of a newspaper has grown out of the special postal privilege of carriage at 1 cent a pound, payable in bulk. This rate is one-thirty-second of the rate for letters and one-eighth of the rate for books and other printed matter. This low rate was avowedly granted because of the value of a newspaper to the community. The newspapers and periodicals which receive this rate, established March 3, 1885, must be "regularly issued at stated intervals as frequently as four times a year from a known office of publication and mailed by the publishers or news agents to actual subscribers or as sample copies to news agents for sale." A public journal claiming this low rate of carriage, first enacted at 2 cents a pound in 1879, must be registered at a post office as second class. Any newspaper published daily must in April or October, under the Act of Aug. 24, 1913, print its average paid circulation for the previous half year and the names of its owners and of those holding mortgage or bonded indebtedness. The Federal Supreme Court held (1915) that this regulation was no infringement of the constitutional guaranty of the freedom of the press, since it applied only to periodicals using this special cent-a-pound rate. This requirement as to circulation does not apply to weekly or monthly issues. This omission is due in part to the local political influence of the country weekly and the conviction that the daily has an organic influence on society more instant than that of the weekly and monthly.

These regulations and this special privilege in postal rates are extended to many publications believed to be of public use and value, educational catalogues and reports, issues of experiment stations, and reports of beneficiary and benevolent societies. Many judicial and administrative decisions on the grant of this privilege have united in defining a periodical as earmarked by recurrent publication, a subscription list made and paid in good faith, and the newspaper as published at least once a week.

The definition of a newspaper in the United Kingdom (Newspaper Libel and Regulation Act, 1881) is "any paper containing public news, intelligence, or occurrences, or any remarks or observation thereon, printed for sale and published periodically in parts or numbers at intervals not exceeding 26 days."

The British post office limits "newspapers" to publications "at intervals of not more than seven days." Special regulations of a similar character and providing for a more direct regulation exist in the self-governing colonies, crown colonies, and in the Anglo-Indian Empire. All countries (see PRESS, FREEDOM OF THE) now have analogous regulations of periodical publications.

The term "newspaper," while legally applied to a weekly, usually indicates a daily publication issued either in the morning or in the afternoon. In the United States, by an agreement (1915) among about 800 dailies having over 85 per cent of the total daily circulation, the evening paper must not be issued before 11 A.M. or after 6 P.M. The city daily necessarily covers various fields, e.g.: (*a*) the events of the place in which it is published; (*b*) events from without (see PRESS ASSOCIATIONS); (*c*) opinion, usually given on a separate page, known as the editorial page; (*d*) the quotation of stock, cereal, and other exchanges; and (*e*) advertisements. To these are added combined criticism and record, in special articles and correspondence on special fields, as politics, sports, theatre, letters, education, etc. Usually the earlier pages of the newspaper open with news from without and pass to local news. The markets and the larger share of the advertisements are usually on later pages. The editorial page, or expression of opinion, is generally between. When the two sides of a four or eight page sheet had to be printed successively (until the invention of the web perfecting press), this division was necessary. Although this plan is still often retained through custom, an arrangement is now established in the United States in which important news, likely to attract buyers, gravitates to the front, and other news to the rear pages, an arrangement long prevalent in the French boulevard press. In some evening papers in the United States, covering about one-third of the total circulation, and in some morning papers, the editorial page is the last page, and this has become in morning papers an important advertising page. As politics is the one subject of universal interest for men, newspapers in all countries where a bipartisan organization for the control of an elective government exists tend to ally themselves with one of two political parties. Where, as in European countries, parties are replaced by groups, each has its newspaper. In both cases some papers are known as independent. In all, newspapers exert a double influence. Those who read are directly affected by what is printed, as with all printed utterance;

but the periodic issue and the marshaled array of subscribers or regular readers give newspapers in politics and other fields a representative character, their influence depending on the fact that what is said expresses the opinion of a great multitude of readers, or it would not retain them. The skillful editor succeeds in combining leadership in new exigencies and problems with the capacity of expressing the opinion or sentiment that great masses of his readers feel as new events call for the application of old principles.

This fiduciary relation of a periodic publication, dependent on periodic and continued purchase, to the opinion of those who take it, with the reflex influence of the periodical in molding the opinion of those who read it, extends to all branches and fields. Every organized body needs its periodic and systematic expression, just as continuous thought in the individual is only possible through a common consciousness. The religious weekly always represents more or less closely some communion. The trade paper does this for an industry. The college student (see Journalism, College) needs a paper for his world. The larger corporations—railroads, industrial corporations, and associations of capital for various purposes—find a house organ—a weekly or monthly issued to employees—useful. Large newspaper offices issue such sheets for office use and coördination. The newspaper calling and newspaper publishers find a trade journal necessary, and advertise in it their advertising opportunities to reach their special world of general or national advertisers.

Two empires, the Roman and the Chinese, had from an early period issues similar to the newspaper. The *Acta Diurna* (q.v.) (Daily Occurrences) of ancient Rome contained reports of great military achievements and of interesting events at Rome, as reports of elections, trials, games, fires, sacrifices, and miracles. They were written by officers called *actuarii*, and deposited among other public archives. Copies were sometimes posted in public places, and sent first at irregular and later at regular intervals to the generals in the provinces, that the army might be informed of what was taking place in other parts of the Empire. They continued to be issued until the downfall of the Western Empire, and a file of this publication was in existence in the fifth century.

The Peking gazette, *Tching-pao* (News of the Capital), has appeared since 713 to 741 A.D., in the T'ang dynasty at the Chinese capital, and has for many centuries been issued daily. It is printed in a government edition sent to officials and in a popular edition with regular subscribers, reprints also appearing in the provinces, both having been furnished from an early period. It consists exclusively of Imperial rescripts, council decrees, and official news. It was undoubtedly the earliest daily in existence. It ceased publication about 1900, and its title is used by its successor in Peking. Both the *Acta Diurna* and the *Tching-pao* were officially bulletined daily, the former on the Domus Regia (see Forum) and the latter in the Imperial city. One was copied by two scribes and the other issued in print by several offices.

Neither of these official issues has any relation with the modern newspaper by example, still less by direct connection. The newspaper, as known to-day, is of composite origin. In the sixteenth century it was represented by news sheets, single folio pages sold by peddlers and criers giving news of a single occurrence. The first dated examples of these appeared in 1498, and some 800 examples are preserved which appeared before 1510.

These small news sheets appeared in Augsburg, Vienna, Ratisbon, Nuremberg, Antwerp, and many other places, generally in the form of letters. The extant numbers contain, among other matters, accounts of the discovery of America, of the conquests of the Turks, of the French and Austrian War in Italy, with such local occurrences as executions, inundations, earthquakes, burnings of witches, and child murders supposed to be committed by the Jews. Of like interest are the official *Notizie Scritte*, established by the Venetian government in 1566, containing accounts of the wars carried on by the Republic and of other events of general interest. At first they were not printed, but might be read in various public places on payment of a small coin, called a *gazzetta*, whence the name *gazette* (q.v.).

These represented the issue of floating rumor or a private letter by the presses of the day. As the press ceased to be a personal and became a business venture, and regular communication was established by various posts over European countries, these broadsheets of news and opinion developed into the journal regularly issued, of which the *Frankfurter Journal*, published by Egenolph Emmel in 1615, suspended in 1902, was the first—a news-book presenting several news-letters printed together in occasional issues. The news-letter—furnished to the correspondent by men usually in official life at the different capitals, the prototype of the later dispatch and correspondent—and the pamphlet, discussing opinion, which began treating public affairs all over Europe from the standpoint of the editorial in the seventeenth century, prefigured the newspaper. By the opening of the eighteenth century these became united in daily journals which combined the report of the broadsheet, the correspondence of the news-letter, and the polemics of the pamphlet, adding the advertisement in 1648 and the regular market report at the close of the eighteenth century.

England. The English News-letter, preserved in the Paston Letters, is scattered in many collections of correspondence and continued until Wilkes and the movement of which he was leader asserted freedom for the press in the middle of the eighteenth century. The *English Mercurie* (1588), often cited, is a forgery. *Nouvelles de la République des Lettres*, monthly (1585), and *Mercurius Gallobelgicus* (1594–1635), an annual, by circulating in England, gave the idea of a periodical issue of the printed sporadic news-letter. This beginning at the end of the sixteenth century has its first existing example in a *Relation* (1603). Ralph Rounthwaite issued, 1619, a serial news-letter covering news in Europe for two months. Of *A Currant of Generall Newes* (May 14, 1622) no copy remains. The issue, May 23, by Thomas Archer and Nicholas Bourne begins the record of the serial periodically issued in English. Nathaniel Butter became chief publisher eventually (1624). Thomas Archer (1625) began a serial with running title *Mercurius Britannicus*. After this came the swarm of serial issues in the civil wars, printing letters and relations of events, coupled with acrid and unbridled abuse by way of opinion. Sir Roger l'Estrange issued (1663) the *Public Intelligencer*, the first general newspaper, superseded by the London *Gazette*, published at Oxford in 1665, the year of the plague. From the Licensing Act (1662) to its repeal (1695) the English press was halted. Besides a swarm of news-letters, posts, and mercuries, there appeared: London, *Daily Courrant* (1702–03), first English daily (present *Post* began 1771); Defoe's *Review* (1706–12); *Orange Postman* (1703), first penny paper. By the year 1711 the total weekly circulation of London papers, daily and weekly, was estimated at 40,000, nearly a quarter of which was furnished by Addison's *Spectator*. In 1712 the Stamp Act appeared and sensational sheets were able to survive, but the *Spectator* of Addison (q.v.) and the *Review* of Defoe (q.v.) disappeared. This tax (halfpenny, 1712; penny, 1757; penny and a half, 1776; 2 pence, 1789; 2½ pence, 1794; 3½ pence, 4 pence, 1815; penny, 1836), abolished in 1855 and the paper duty, repealed in 1861, for a century and a half restricted the English newspaper to the upper and middle classes, with results only now vanishing.

The *St. James's Post* and the *St. James's Evening Post*, each started in 1715, were fused in the *St. James's Chronicle* (1724), the liveliest paper of the period. The London *Daily Post and General Advertiser*, founded in 1726, changed its name in 1752 to the *Public Advertiser*, and was afterward famous for the contributions of Junius. In 1762 John Wilkes issued the first number of the *North Briton*. The *Morning Chronicle*, established in 1769, was the first newspaper to give adequate reports of parliamentary debates; it invented the leading article, and in its columns first appeared Hazlitt's dramatic criticisms.

The *Times* is the one eighteenth-century paper which continued its position unchanged across the nineteenth century to the twentieth. Beginning as the London *Daily Universal Register* (1785), it became (1788), in the hands of John Walter (q.v.) and his descendants, the foremost of English papers in news and opinion. In 1814 it applied steam to the printing press; in 1856 it began stereotyping from papier-mâché; 1869 brought in the Walter cylinder press, later superseded by the Hoe; and in 1878 it used type-setting machines. It led in the English reforms of the first third of the nineteenth century, began exposures, forced a reorganization of the English ministry by its Crimean War news, and by placing able correspondents over Europe has published more important news in advance than any other one newspaper. John Thaddeus Delane, its editor (1841–77), wielded a larger influence than any other English journalist. From 1815 to 1904 sold at 7 to 3 pence, the latter price from 1861 to 1904, it is now sold at one penny, its circulation from 40,000 to 60,000 becoming insignificant under new conditions.

The *Morning Post* (1772) had Coleridge for its leader writer (1795–1802), whose articles forced the rupture of the Treaty of Amiens, and to it Wordsworth, Young, Moore, Praed, and Mackintosh contributed. Satirized by Thackeray for its social news, this record made it an important Conservative organ under one family for three generations—Peter Borthwick (1847–52), his son Algernon Borthwick, later Lord Glenesk (1852–1908), and at his death remained under family control.

The *Daily News* appeared in 1846 with Charles Dickens (q.v.) as editor for three months, and continued to 1896 the Liberal organ. It alone among London dailies supported the North in the American Civil War. John R. Robinson was its manager (1868–1901), reducing its price to a penny, and in 1901 George Cadbury, the cocoa maker, buying it, the paper became anti-imperialistic. The *Daily Telegraph* (1855) began at a penny, became the property of Joseph Moses Levy, whose son, Edward Lawson Levy, Lord Burnham (1903), and his grandson, H. W. Levy Lawson, have managed it. George A. Sala, Edwin Arnold, Clement Scott, H. D. Traill, W. L. Courtney, and Edward Dicey have distinguished the paper, which began the work of raising funds, sending out extra editions, and creating harmless sensations, acquiring the first great mass circulation in England. The *Standard* (1827) began Conservative, supported the South in the American Civil War, distancing other papers in its news as in most wars since, and under W. H. Mudford became a great power from 1873 to 1900. In 1904 it became the property of C. A. Pearson (owner of the *Daily Express*, a halfpenny paper), changing to protection, and in 1910 changed hands again.

The *Globe* (1803) is the earliest of existing London evening papers and has passed through many hands. The *Pall Mall Gazette* (1865), under Frederick Greenwood (q.v.) (1865–80) and W. T. Stead (q.v.) (1883–89), had more influence than any other evening paper before or since. W. W. Astor bought it in 1892 and sold it in 1914. The *St. James's Gazette* (1880–1900) endeavored under Frederick Greenwood, Sidney Low, and Hugh Chisholm to be a paper for the few but cultured, failed as a business and was (1903) amalgamated with the *Standard*. The *Westminster Gazette* (1893) has filled a like place in Liberal politics. The London *Echo* (1868) halfpenny, after many vicissitudes, became successful in 1894 in the hands of the Harmsworths. The *Star* (1888), founded by T. P. O'Connor, passed to Cadbury (1909), and the *Sun*, also begun by O'Connor, ended in 1906.

In the NEW INTERNATIONAL ENCYCLOPÆDIA a remark was made a decade ago that journalism in England was at a point of transition not yet fully developed. Ten years have shown the truth of this and decided the trend. The *Times*, so long representing the foremost traditions of English journalism, lost in advertising and in influence and found itself beset by a great increase in circulation of cheaper papers. Both its proprietorship and much of its character changed. It passed under the control, though not under the exclusive ownership, of Lord Northcliffe (q.v.), who, as Alfred Harmsworth, had begun in England the popular journalism which between 1885 and 1905 ran its course in the United States. The *Daily Mail* (1896), the most important of his group of newspapers, rose to a circulation of 1,000,000 to 1,500,000, with twin publication offices in London and the Midlands, becoming easily the morning paper with the largest circulation not only in England but in any land. This change in the newspaper which had spoken for a century for the classes and the improvement in the position and influence of the newspaper which had come to speak for the masses, had its influence on the entire round of English periodicals. The dailies of all prices moved in the same direction, and the weeklies, even a paper like the *Athenæum*, became more popular, and English journalism ceased to be any longer the journalism of a class. The English public or Board-school education which began in 1870 had in a generation produced a new field of readers, as had common-school education in the United States between 1850 and 1890. Possessing the attention of this new audience, the *Times* speaking to the classes and the *Daily Mail* to the masses, Lord Northcliffe led in the movement which forced a coalition ministry in May, 1915. See WAR IN EUROPE.

The London literary and society papers have a line of connection with Addison. The numerous imitations of the *Spectator* (1711–12) were essays on manners and literature. The nineteenth-century type of the weekly review was set by Leigh Hunt (q.v.) in the *Examiner* (1808–86), which combined literature and politics. Under its first editor and Albany Fonblanque (q.v.) it had a brilliant career as an exponent of current radicalism. The *Athenæum* (1828) confines itself to literature, art, and music, and has been for four generations in the hands of one family, from Charles Wentworth Dilke in 1830 to the third baronet of the same name, Sir Charles Wentworth Dilke. Though it has had many rivals, it is to-day one of the most trustworthy reviews in the world. The *Academy* (1869) is similar in design, but runs more to gossip. The *Saturday Review* (1855) was at start conservative and dull. It quickened under Beresford and J. D. Cook, Lord Salisbury (then Robert Cecil), Mrs. Lynn Linton, J. R. Green, Charles Mackay, and Laurence Oliphant. For 25 years past this record has not been maintained. In 1855 the *Saturday Review* was the most solid, to-day it is the smartest, of English weeklies. The *Spectator* (1828) under R. S. Rintoul (to 1860) exerted for 30 years a fruitful influence for reform. After R. H. Hutton (q.v.) assumed the editorship (1861–97) it became less radical in tone, and its sane discussions of politics and literature were among the best that journalism has ever offered. It holds its high position with more conservative politics under J. St. Loe Strachey. As the champion of radicalism, the *Speaker* was established in 1890 by T. Wemyss Reid, and was merged in the *Nation* in 1907. Other reviews of literature, society, and politics (one or all) are the *Literary World* (1868); the *Observer* (1791), the oldest London Sunday paper, since 1905 owned by Lord Northcliffe; the *Outlook* (1898), lately enlarged; the *Guardian* (1846), the leading religious paper in England; the *Weekly Register* (1849); *Pearson's Weekly* (1890); *Vanity Fair* (1868), comic and society; the *Pelican* (1887); the *Critic* (1895); *Lloyd's Newspaper* (1842); the *Referee* (1877), known for G. R. Sims's work; *Reynolds's Newspaper* (1850), Sunday, radical weekly labor organ; the brilliant *World* (1874), founded by Edmund Yates; and the trenchant *Truth* (1877), under Henry Labouchere (q.v.). Popular are several light journals approaching the magazine, such as *Tit-Bits* (1881) and *Answers* (1888). At the head of illustrated weeklies stand the *Illustrated London News* (1842); the *Graphic* (1869); the *Sphere*, merged with *Black and White* (1891–1911); the *Sketch* (1892). There are also reviews for distinct trades and professions and pastimes—the *Field* (1853), sports; the *Illustrated Sporting and Dramatic News* (1874); the *Economist* (1841), early associated with Walter Bagehot, and the *Statist* (headed by Sir George Paish), for the markets of finance; *Engineering* (1866); *Lancet* (1823), medical; and so on through many phases of contemporary life. Among comic journals, *Punch* (q.v.) still leads.

The press of London, taken collectively, has passed through three broadly marked stages. It began on a mere transcript of the city's rumor, gossip, and abuse. Repressed by the Licensing Act for a generation, on the repeal of that Act, 1695, it took two forms—one literary, of which Addison's *Spectator* was the highest type, and the other bitterly polemic (L'Estrange and Defoe). In these journals, which appeared in quick succession for a century, the personality of the editor was decisive. With the Napoleonic wars English journalism entered on a third stage—led and molded by John Walter, the founder of the London *Times*—in which the personality of the editor became only one factor, though still of importance, in a compact organ of public opinion and vehicle of public news, whose articles were anonymous and whose editor was by a transparent fiction unknown. The weight and influence of journals in this period turned on the success with which editorials expressed the opinions of the ruling forces of the nation, of a party, a class, or an interest, and the accuracy and impartiality with which its news columns recorded facts. While this type was most completely developed in the *Times*, it was apparent in all English periodicals, daily, weekly, and monthly, from the Napoleonic wars until the defeat of Gladstone's Irish Home Rule Bill recast party relations and based the Conservative-Imperialist majority on a mass vote. With this period English dailies began developing circulation independent of influence, signed articles and the personal journalist became conspicuous, and the publisher with an avowed commercial aim had an increasing control and influence. The earlier newspaper, like the *Times*, waned in weight, and the type of the new was yet to be developed.

The earliest provincial English newspaper was the Worcester *Postman* (1690), which, under the name *Berrow's Worcester Journal*, still circulates freely through the West Midlands. Five years later was founded the Stamford *Mercury*, now called the *Lincoln, Rutland, and Stamford Mercury*. In 1706 appeared the Norwich *Postman* at a penny, with the announcement that a half-penny would not be refused. It was followed by the Norwich *Mercury* (1714), which still exists. Among other early successes were the Nottingham *Courant* (1710), which with changed name continued till 1886, when it was incorporated with the illustrated *Weekly Express;* the Newcastle *Courant* (1711); the still prosperous Hereford *Journal* (1713); the Leeds *Mercury* (1718), one of the best of provincial papers; the *Salisbury and Winchester Journal* (1729), now an influential paper; and the Birmingham *Gazette* (1741), to-day one of the leading Midland dailies. These examples, without the catalogue of numerous failures, show how the newspaper spread through England early in the seventeenth century. They were, however, small sheets, and continued to be such till about 1860. Still other well-known English papers are the *Leeds-Yorkshire Post* (1754), with a daily issue since 1866 and an evening since 1890; the Newcastle *Chronicle* (1764), now issuing two daily editions; the Liverpool *Courier* (1808), two daily issues and a weekly; the Liverpool *Daily Post* (1855); the Leicester *Daily Post* (1872);

the Sheffield *Telegraph* (1855), the Birmingham *Post* (1857); the *Western Morning News* (1860), Plymouth; and the Manchester *Guardian* (1821), which has a reputation far beyond England for its independence and able comment. A few newspapers are printed in the Welsh language. Among them are *Y Genedl Gymreig* (The Welsh Nation) and *Baner ac Amserau Cymru* (Banner and Times of Wales).

Scotland very naturally had a hand in the numerous sheets employed to circulate information during the civil wars. The first to be printed in Scotland was the *Mercurius Politicus* (Leith, 1653; Edinburgh, 1654–60). Under the title *Mercurius Publicus*, it continued till 1663. The *Mercurius Caledonius* (Edinburgh, 1660) failed after 10 issues. The establishment of the newspaper in Scotland was due to James Watson, who was both editor and printer. He started the Edinburgh *Gazette* (1699); the Edinburgh *Courant* (1705), a tri-weekly, which suspended after 55 numbers; and the *Scots Courant* (1706), continued till 1718. In 1718 appeared the Edinburgh *Evening Courant*, and two years later the *Caledonian Mercury*, which continued for nearly a century and a half. The *Scotsman* (Edinburgh, 1817), a daily since 1855, the most substantial journal in Scotland, is also most favorably known in the United States. Among the numerous other good Scottish journals are the Glasgow *Herald* (1782), an independent daily with a weekly issue; the Glasgow *Weekly Mail* (1862); the Dundee *Advertiser* (1801), daily; the Dundee *Weekly News* (1855), having a circulation above 250,000; the Aberdeen *Journal* (1748), daily and weekly; and the *North British Daily Mail* (Glasgow, 1847).

Ireland. During the civil wars there were printed in London several sheets containing news from Ireland, as *Warranted Tidings from Ireland* (1641) and *Mercurius Hibernicus* (1644). The first real Irish newspaper was the Dublin *News-Letter* (1685). Fifteen years later came the first Dublin daily, *Pue's Occurrences*, which was continued for a half century. In 1728 appeared another daily, *Falkener's Journal*. *Esdaile's News-Letter* (1744), changed to *Saunders's News-Letter* (1754), a Dublin triweekly and then a daily, lasted till 1879. The official Dublin *Gazette* (?1710) still continues. The oldest provincial Irish newspapers are the daily Belfast *News Letter* (1737), the semiweekly Waterford *Chronicle* (1766–1913), and the Limerick Chronicle (1766). Among the most flourishing Dublin newspapers are the famous *Freeman's Journal* and the *Evening Telegraph* (1877); the *Weekly Nation* (1847) ceased publication in 1911. The Belfast *Northern Whig* (1824), with a large circulation in Ulster, is also well known outside of Ireland.

British Colonies. In British North America the chief places from which newspapers (daily and weekly) are diffused are Toronto, Montreal, Ottawa, Quebec, and Halifax. Among the earliest journals were the Halifax *Gazette* (1751), which lasted hardly 20 years, and the Montreal *Gazette* (1765), now a daily and weekly. Toronto, though later in the field, takes the lead to-day with its five dailies and many weeklies, among which are the *Globe* (morning, evening, and weekly), the *Daily Mail*, and the *Evening News*. Quebec and Ottawa support several dailies and weeklies in French.

India. The deportation clause in the early libel act, censorship, and a rigid license act restricted journalism in India, and a press law still leaves all newspapers published in the vernacular subject to administrative suppression. Anglo-Indian journalism began with the *Indian World*, Calcutta, edited by William Duane in 1794, deported by the East India Company. He was afterward editor of the *Aurora*, Philadelphia, Pa. About 30 years later J. S. Buckingham was also deported. In 1800 nine newspapers were started and soon suspended. Early in the nineteenth century the English papers were the *Englishman*, started in 1821 as *John Bull in the East*, *Hurakarn*, Calcutta *Star*, and *Friend of India*. Much of Rudyard Kipling's early work appeared in the Lahore *Civil and Military Gazette*. In Calcutta nine dailies are published in English and seven in the vernacular. The *Indian Daily Mirror* (1863) is the first daily in English edited by natives. The *Hindu* of Madras is the oldest daily in the city. In 1832 there were six European and five native papers in India; in 1875, 155 English, 254 vernacular, and 69 mixed English and vernacular; in 1885, 127 English and 277 vernacular, with 67 not designated in the Punjab; and in 1910, when the last Press Sedition Act was enacted, the number was officially given at 2000, two-thirds native. The first Act designed to curb the native press was that of 1878. In 1897 a young man, Bala Ganghadar Tilak, began an attack which brought repression and ended in his deportation in 1908 and a more severe Act two years later. One-third the total circulation of papers in India is in Calcutta and Bombay.

Australasia and South Africa. Journalism in Australia began with the Sydney *Gazette*, of which but one complete file is in existence at the Sydney Government House. This has been issued in facsimile. The history of journalism in Australia is marked with failures from 1810 to 1860. But to-day the dailies and weeklies of large circulation are numerous. Though the press has been established in the small towns, the great journalistic centres are Melbourne and Sydney, and next to them Adelaide and Brisbane. We may cite for Melbourne the *Argus*, the *Age*, the *Herald;* for Sydney, the *Morning Herald*, the *Daily Telegraph*, and the *Evening News;* for Adelaide, the *Register*, the *Advertiser*, the *Express*, and the *Evening Journal;* for Brisbane, the *Courier*, the *Daily Mail*, the *Observer*, and the *Telegraph;* for Perth, the *West Australian*, the *Daily News*, and the numerous journals devoted to building, mining, stock raising, and shipping; Hobart has the *Mercury* and the *Daily Post*, with which is incorporated the *Tasmanian News;* and Launceston, the *Daily Telegraph* and the *Examiner*. The Australian papers are remarkable for the large number of pages in an issue, larger in proportion to population and circulation than in any other country, particularly in the case of weeklies. Their news is, however, too provincial, and they rely on association cable dispatches.

New Zealand's first paper was the New Zealand *Herald* (1841), now consolidated with the Auckland *News*. It was published for a year, revived (1863) by W. C. Wilson, and merged in its present ownership (1864). It is one of two dailies in Auckland. The New Zealand *Times*, Wellington, is a typical and leading daily, and the *Post*, Wellington, a typical evening paper. Auckland has the *Herald* and *Star;* Christchurch, the Lyttleton *Times* and Christchurch

Press and two evening papers; and Dunedin, the Otago *Daily Times* and *Star*. All the towns have their papers, usually dailies. Among leading illustrated Australian weeklies are the *Bulletin*, Sydney *Mail*, *Town and Country Journal*, and *Australasian*. New Zealand illustrated weeklies are *sui generis* and among the best of their kind in the world, and have large circulations. New Zealand had, in 1914, 233 registered newspapers for a population of 1,147,104; 63 of these were daily newspapers, 64 weekly, and 39 monthly, 25 appearing twice a week. Cape Colony has several weeklies and three dailies, of which may be mentioned the *Cape Argus* and the *Cape Times*, both daily and weekly.

France. The now flourishing *Gazette de France* (daily) is the oldest of all French newspapers. As the *Gazette*, it was established at Paris in 1631, under the patronage of Richelieu, by Théophraste Renaudot (1584–1653). It first appeared weekly, with a monthly supplement, and afterward as a semiweekly. Being thus a continuous record (except for a slight suspension) of foreign and domestic events for almost three centuries, it possesses very great historical value. Before the close of the seventeenth century it began to give space to commerce, theatrical announcements, and advertisements. The *Gazette Burlesque* (1650–65), the first journal of the kind, aimed to be the *chronique scandaleuse* of Paris. The two types thus established were continued in the *Mercure Galant* (1672), which, under different names, commonly the *Mercure de France*, was continued—in 1790 reaching 13,000 circulation—with short interruptions, down to 1853. The rather insipid *Journal de Paris* (1777–1819) is said to have been the first Parisian daily, and in 1792 had 20,000 circulation. During the Revolution journals sprang up rapidly as organs of the various parties, but they soon expired. Two, however, have lived till the present time—the *Journal des Débats* (1789) and the *Moniteur Universel* (1789), the official organ under the first Napoleon. The *Constitutionnel*, in which Sainte-Beuve began the *Causeries du lundi*, dates from 1815. In 1836 were established, the first by Girardin (q.v.), two cheaper papers, the *Presse* and the *Siècle*, now popular dailies. The *Figaro*, the modern *journal de scandale*, established in 1854, became a daily in 1866. It has had considerable influence on the lighter newspaper in England and elsewhere. The *Charivari* (1832), a *journal satirique*, has likewise been imitated in many countries. The *Patrie*, political, commercial, and literary, was a daily from the first (1841). Of all Parisian newspapers, perhaps the *Temps* (a daily, 1861) has the most solid reputation abroad. The Parisian political press is further represented by the *Soir* (1870), the *Matin* (1884), and many others. The *Petit Journal* (1863), the first French paper selling at five centimes (half the usual price), at once gained a circulation of 100,000. After arrangements were made whereby it could be furnished throughout France at the same price, its daily issue, under the demand for Zola's (q.v.) earlier novels, rapidly increased till it reached 1,000,000.

The French press began in Paris and long primarily represented that city and its news. While a group of provincial journals have appeared in the past 30 years, Paris journals fill a place the press of no other city does. A personal aspect was given the French press by this, deepened by the law passed in 1850, *loi Tinguy*, repealed 1881, requiring every article to be signed. If this lessened the news printed, it improved style, and the French journal has a higher place in literature than any other. Twenty years ago the entry of France on an active colonial foreign policy increased the demand for news, furnished chiefly by resident correspondents and marked by the interpretation of affairs rather than a mere daily record by wire. The leading papers remain as in the past, but Socialism has added journals, as *L'Humanité* and *L'Aurore*, and personal sheets like the late Henri Rochefort's *Intransigeant*. Relative to population, the circulation of French dailies is a third that of the American press.

Belgium. Antwerp, one of the places from which were issued news-letters in the sixteenth century, produced the *Nieuwe Tijdinghen* (?1605), on which were founded the *Posttijdingen* (1637–44) and the *Gazette van Antwerpen* (down to 1827). To the period 1640–50 belong the *Nieuwe Tijdinghen* of Bruges, the *Brusselsche Gazette*, and *Le Courier Véritable des Pays-Bas* (Brussels), which, as the official *Gazette de Bruxelles* and the *Gazette des Pays-Bas*, continued till 1791. The Belgian press, held in firm restraint during the Spanish, Austrian, and French rule, became practically free on the independence of Belgium (1830). Before the European War Antwerp had 7 dailies, Brussels about 20. The chief were the *Indépendance Belge*, the *Etoile Belge*, and the *Journal de Bruxelles*. At Antwerp and at Ghent dailies were published in Flemish.

Holland. At present the principal Dutch dailies are the *Allgemeene Handelsblad* and *Nieuws van den Dag*, both of Amsterdam; the *Amsterdamsche Courant*, the *Journal de la Haye*, the *Haagsche Courant*, and the *Staats Courant*—published at The Hague. In 1914 Amsterdam had 10 dailies; The Hague, 7; Haarlem, 3; Rotterdam, 5, with many weeklies. Weeklies, several of which are illustrated, are also common.

Switzerland. The Swiss papers are devoted mostly to local interests. They are, however, well managed, especially the dailies at Geneva, Bern, and Lausanne. For tourists there is published at Geneva the *Swiss and Nice Times*, in both French and English.

Germany. The news sheets of the sixteenth century led to the newspapers that began to appear just after 1600. Frankfort-on-the-Main was among the first with the *Frankfurter Journal* (1615) and the *Frankfurter Oberpostamtszeitung* (1616), which, as the *Frankfurter Postzeitung*, lived till 1866. Periodical papers were soon established in other towns, as Strassburg, Nuremberg, Hildesheim, Augsburg, Munich, Hamburg, and Leipzig (1660). The *Hamburgischer Correspondent* (1714), still existing, is famed as being the first to have a regular foreign correspondent, a French refugee living in England (1725–35). The *Allgemeine Zeitung*, started at Augsburg in 1798 and published since 1883 at Munich, from the first a weighty political organ, ranked among the foremost papers of Germany. The press in Germany was long under severe restrictions. The press laws of Germany are in theory liberal. In practice, however, by a rigid application of the law in regard to lese majesty, the courts have come to construe almost any criticism of current administration as an insult to the constituted authorities. Even a comment on the frequency of railroad accidents has been visited with court proceedings, and the editor of *Kladderadatsch* was imprisoned for two months for a cartoon which represented a group of great soldiers of the past reading the Emperor's speech to his guard, declaring that it was necessary to be a good Christian in order to be a good soldier. In addition, German papers are, through many agencies, influenced or controlled by the government. Berlin had, in 1914, 21 dailies, among which are the *Vossische Zeitung*, the *Norddeutsche Allgemeine Zeitung*, the *Neue preussische Zeitung*, *National-Zeitung*, the *Tägliche Rundschau*, *Germania*, *Volkszeitung*, and the *Vorwärts*, Socialist. Notable is *Zukunft*, edited by Harden. The Cologne *Gazette* is known for its foreign news. From all the great cities of Germany issue many weeklies, some of which are illustrated. The leading comic periodicals are *Fliegende Blätter*, *Simplicissimus*, *Jugend*, Munich, and *Kladderadatsch*, Berlin. In artistic ability, these lead the world.

Austria-Hungary took an active part in the early history of journalism and has kept abreast with modern methods. Of the Vienna dailies, numbering (1914) 14, the most important are the *Neue Freie Presse* (1864), *Neues Wiener Tageblatt*, *Wiener Allgemeine Zeitung* (1880), *Deutsche Zeitung*, the semiofficial *Fremdenblatt*, and the official *Wiener Zeitung*, with its semiofficial evening edition, *Wiener Abendpost*. Budapest has 19 dailies, of which *Pesti Napló* (Pest Daily), *Egyetértés* (Union), and *Pesti Hirlap* (Pest Gazette) are the most prominent in Hungarian, and the *Pester Lloyd* and *Neuer Pester Journal* in German. Among the provincial papers the foremost in German are the *Bohemia*, in Prague, the *Grazer Tagespost*, the *Tricster Zeitung;* in Czech, the *Národni Listy* (National News), in Prague; in Polish, the *Czas* (Times), in Cracow; and in Italian, the *Independente*, in *Triest*. As in France, considerable space is given by the press of Germany and Austria to literary reviews and short stories.

Scandinavia. The earliest Swedish paper seems to have been the *Ordinarie Post-Tidende* of Stockholm (1643–80). A little later came the *Svensk Mercurius* (1675–83) and the *Relationes Curiosæ*, in Latin (1682–1701). In the eighteenth century were established two French papers, the *Gazette Française* (1742) and the *Mercure de Suède* (1772). The first political paper of importance in Sweden was the *Argus*, founded by Johannsen (1820). Ten years later were established the *Fäderneslandet*, the organ of the Royalists, and the *Aftonbladet*, the organ of the Reformers, now the leading dailies of Stockholm. The first Norwegian newspapers were the *Christiania Intelligentssedler* (1763) and the *Adressecontors Efterretninger* (Bergen, 1765). Christiania has (1914) 12 and Bergen 3 dailies. In both Norway and Sweden semiweeklies and triweeklies are common. The press of Denmark dates from the *Danske Mercurius* (1666). Down to 1830 the papers of Denmark were made up mostly of extracts from foreign journals; and those outside of Copenhagen are still very poor. Copenhagen has (1914) 13 dailies, morning and evening, of which the oldest is the *Berlingske Tidende* (1749). The *Aftenposten* enjoys the largest circulation. At Reykjavík in Iceland are published two small journals.

Italy. As has already been mentioned, Italy with her ancient *Acta Diurna* and the Venetian gazettes of the sixteenth century, was the original home of the newspaper. The succeeding sheets fell into disfavor with the popes and were denounced in a bull issued by Gregory XIII. The *Diario di Roma* (1716) was the leading Italian newspaper for more than a century. Next followed the *Gazzetta di Napoli*. Up to 1848 the newspapers of Italy, subject to strict censorship, were small and politically insignificant. Press laws then became liberal, and as a result newspapers sprang up rapidly. Among the six Roman dailies may be cited the *Opinione* (established at Turin in 1847 and afterward removed to Rome), *Diritto*, *Riforma*, *Fanfulla*, and the *Voce della Verità* (in the interest of the Pope). Florence issues the *Corriere Italiano* and one other daily; Genoa, the *Caffaro* and the *Corriere Mercantile;* Milan, seven dailies, among them the influential *Corriera della Sera* (1876); Turin, five; Venice, four; and Naples, six. There are also several illustrated and humorous weeklies.

Spanish Peninsula. Though there were earlier sheets published at irregular intervals, the first Spanish newspaper seems to date only from the eighteenth century. Even for some time after 1800 Madrid had only its *Diario*. Indeed, the press in Spain had a hard career till the revolution of 1854. Dailies in all the chief cities are now numerous. Madrid has (1914) 18, among which are the *Imparcial* and the *Correspondencia de España*, and Barcelona 11. Among the Madrid illustrated weeklies are the *Correspondencia Ilustrada* and the *Ilustración Española y Americana*. From the American standpoint the news in Spanish papers is meagre. This is also true of the 17 dailies of Lisbon.

Russia. The earliest newspapers of Russia were issued under the direction of Peter the Great, first at Moscow and then at St. Petersburg, to report the progress of the war with Sweden. The first gazette, the *Viedomosti*, appeared in Moscow in 1702. The issue of 1703, preserved in the Imperial Library at St. Petersburg, was reprinted in 1855. Political journalism, however, has only been permitted in Russia in the past decade and under many limitations. The flourishing period of the press has been at the time of national crises, as the French invasion of 1812, the Polish insurrection of 1830, the Crimean and Japanese wars. The official organ is the *Journal de St. Petersbourg*. The *Novoe Vremya* (New Times), the *Novosti* (a news and stock gazette), and the *Severnaya* (Northern Bee) circulate widely from St. Petersburg. The oldest Moscow daily is the *Moskvskia Vedomosti* (Moscow News), dating from 1766. Russian papers, necessarily occupying themselves mainly with scientific and literary subjects, make much of the feuilleton. The weekly *Niva* (Harvest Field) issues two large monthly supplements.

Turkey. As with all Moslem lands, the mosque, the Dervish monastery, its peripatetic preachers, the market, the khan, limitless hospitality, and the crier furnished a network of means to distribute information and opinion. In 1727 printing began under an opinion (*fetwa*) of the Moslem pontiff, Sheik ul Islam, that it was permissible under the sacred law. Verminhac, French Minister in 1795, published a French newspaper for some years. The *Spectator de l'Orient*, Alexander Blacque, editor, Smyrna (1825), was the first unofficial issue and, under a changed title, *Courier de Smyrna*, still appears. The first paper in Turkish, *Turkish*

Arabic, was issued in Egypt, by Mehemet Ali Pasha, Nov. 20, 1828. Blacque issued (1831) the *Moniteur Ottoman* for the government at the capital, and the *Takvimi-Vekayih* appeared under a decree from Sultan Mahmud in 1832, as an official organ. The *Djeridie Havadis*, with a subedition, was issued (1843) by N. Churchill, an English subject born in Turkey, and became the first daily. Shinassi and Aghak Effendi started (1860) the *Terjumani Akval*, the first unofficial paper. In 1876, 47 papers appeared in Constantinople, 13 in Turkish. In 1873 the total circulation in the Turkish Empire was 19,304,360; average in 1882–84, 47,772,340; 1897–1900, 64,942,200. In 1913, 389 periodicals were published, 161 in Turkish, 71 at Constantinople. The *Ikdam*, 60,000 circulation, and *Sahah*, 40,000 (1908), are leading dailies. The *Avedaper*, Armenian, formerly weekly, issued by the American Board of Missions; is the oldest of all. Beirut is the centre of the Arab press, *Hadikat el Akhbar* and *Lissan ut Hal* leading dailies. Since 1908 the Turkish press has had great influence. Consult Ahmed Emin, *Development of Modern Turkey, Measured by its Press* (New York, 1914), the best analysis and history of Oriental journalism yet issued.

Greece. During the War of Liberation many papers appeared in Athens, but they disappeared in 1833 on the introduction of caution money by King Otho. Then followed the period of the official organ. The Athenian press is represented (1914) by 10 daily journals in Greek, French, Italian, and English, among which may be mentioned the *Akropolis*, *Ephemeris*, and *Nea Ephemeris*, and by the weekly *Journal d'Athènes* and the *Messager d'Athènes*.

China. The Peking *Tching-pao* has already been described. The European journal has been brought to China by the English and the French. Shanghai and Hongkong have several dailies in English and in Chinese. The native press of China is the product of the past 25 years. The earliest was the *Cheng-pao* of Shanghai, begun by an Englishman, Major, aided by Chinese literati, circulation, 1895, 12,000; the *Hou-pao* (1883); the *Che-pao* at Tientsin; and *Kouang-pao* at Canton. These have been succeeded by a vernacular press all over the Empire, which has a widespread influence. In 1914 a stringent press law was decreed. The *Shih Wu-pao* of Shanghai is one of several sheets started by a viceroy, in this case Chang Chih-tung, to counteract the vernacular press in private hands, and in August, 1898, the subject of an Imperial rescript.

Japan. Japanese journalism owes its initiative impulse and traditions to Fukuzawa, who founded and for many years edited the *Jiji Shimpo*, the leading daily paper in the Empire, published at Tokyo. Himself one of the ablest editors of the century, as prolific as Girardin, as full of moral earnestness as Greeley, and as able in directing public policy as Delane, his paper in the early stages of the Miji educated Japan. The first periodical, *Manhio*, appeared in 1863. The first daily, *Mainichi Shimbon*, was established in 1871 at Tokyo. Among other Japanese papers worthy of mention are: *Nichi Nichi Shimbon* (1872), Count Ito's organ; *Hochi Shimbon*, *Jisi Shimpo*, *Nippon*, *Kohumin Shimbon*, *Kohumin*, and *Noromo*. The *Miro Miro* is a comic paper. In 1883 Japan had 113 newspapers and periodicals, of which one had 1900 circulation; in 1888, 550; and in 1900, 827, of which Tokyo had 201, Osaka 56, and Kyoto 51. The dailies number 150, of which 17 in 1888 had a combined circulation of 130,200. In 1914 the total number of periodicals was about 1800.

United States. The newspaper has an importance in the United States attained nowhere else. A broad area under a common language with a homogeneous population, universal education, easy means of communication, the cheapest mail facilities known, newspaper tolls cheaper in proportion to average distance, though higher for short distances, than elsewhere, a constant interest in political and social affairs, complete freedom from censorship or restriction, except that provided by the libel laws, have given 5 per cent of the population of the world 40 per cent of its newspapers. Less accurate than the English newspaper, not so well written as the French, nor so well equipped as the German, the American newspaper occupies a middle position as compared with them in the extent of its news service, in the freedom of its literary vehicle, and in its habit of treating all subjects from the point of the educator rather than the investigator.

Journalism in the United States has shared the conditions due to material circumstances which affect all periodicals. They have already been described for England, where, a dense population occupying a limited area, questions of transportation play a limited part. The journalism of the Revolution, when for newspaper purposes no common communication existed between Colonial centres, was limited in influence and circulation to the place and region in which each paper was published, and even the New York *Journal*, in which the Federalist appeared, had small influence outside of New York City. When the postal service was fully organized after the Revolution, but remained subject to special carriage until the organization of an adequate stage service along the Atlantic coast in the third and fourth decades of the nineteenth century, the rates upon newspapers were so high that subscription to them was a luxury for the few. The small group of newspapers edited at the chief centres by men of commanding personality, known to the public class of the period, had a most important influence, akin to that of the English journal of the same time, from the general knowledge among men of public affairs of the personality of their editors and their ability to affect the dominant class of their place and region.

The organization of a daily stage service between New York and Philadelphia just prior to the development of railroads, and a reduction in newspaper mail rates gave a wide circulation to weeklies and began the political influence of such newspapers, usually the weekly edition of a daily, which lasted from 1840 to 1875. During this period, in the case of the New York *Tribune*, e.g., the real influence of its editor rested, not upon its daily edition, whose circulation was always outtopped in New York City by two or more other papers, but upon its weekly, which circulated throughout all the North. Political and religious weeklies during this period were the most profitable of newspaper properties and the most potent of political, religious, and social factors. Ten years after the close of the Civil War competition began in the telegraph service, both by cable and by land; tolls dropped; newspaper postage was reduced to a nominal figure; the price of paper per pound began to decrease; train service was improved; the early delivery of the morning paper became possible, within a limit of 200 miles, owing to presses capable of printing a large edition rapidly before breakfast; and during the last quarter of the nineteenth century the daily became dominant. It had for more than half a century held an unchallenged field in all cities of over 100,000 population.

The changes just recited extended the newspaper radius of all cities of half a million or over, and dailies which had been important at a remove of 100 or 200 miles over a great centre, in towns from 50,000 to 100,000, while they suffered no loss in their value as local means of communication and business properties, lost their weight in the daily newspaper field as organs of political and social importance, now that circulation which had been measured by the 10,000 down to 1885 was measured by the 100,000. From 1840, when the power press, the railroad, and the telegraph made the modern daily newspaper possible, down to 1875, a circulation of 50,000 in New York City was remarkable, and nearly all newspapers were well satisfied with half of this. From 1875 to 1885 these figures doubled. From 1885 to 1900, with a few exceptions, a newspaper could not be considered in any city of over half a million as of importance unless its daily circulation turned 100,000, and in cities still larger 150,000 to twice these figures was not unknown. In 1915 these figures must be doubled.

This increase of circulation in the period between 1885 and 1905 was due almost wholly to the cheap newspaper of a strictly popular character. This ceased to be the case with the later development of the American newspaper. The most important phenomenon of the opening of the twentieth century was the very large circulation secured by papers like the New York *Times* and the Chicago *Tribune*, which represent a sober conservative discussion of public affairs, reaching the class of small investors and small property holders which appeared in the United States after 1895 with the creation of great corporations whose shares have been rapidly distributed. The number of these shareholders now reaches upwards of 2,000,000 to 3,000,000, or, adding those who own land, about 8,000,000 property holders.

Most of this circulation is essentially local. This is particularly true of New York. One-half of the circulation of some papers in other cities is outside of the city limits. The rural free delivery added greatly to the farm circulation of the daily newspaper, but this was more apparent in the West than in the East.

For a century circulation has continued to grow at an increasing rate in the American newspaper. While the New York of 1815 had a daily paper to every 15 families, the New York of 1915 has nearly 4 daily papers to every family—a relative increase of sixtyfold. The following table gives the population and the number of families for 1910 and the circulation reported to the Post Office in 1914 in 12 leading American cities.

Where the circulation is apparently larger than about three newspapers to the family, it is because, as in Boston and San Francisco, of a very large suburban area not yet included in the city proper. Where the conditions are as in New York, Philadelphia, and Chicago, the city boundaries including substantially the city population, this proportion of about four papers to the family stands.

The effect of this enormous growth was to change radically both the condition and character of newspapers seeking a large circulation. Where a regulation subscription had been the general source of support, news-stand and street sales became responsible for the great bulk of the edition. Advertisers began sharply to differentiate between the newspaper in each city which sought a large but unstable circulation and the newspaper which aimed at a smaller but secure and more select group of readers. The general retailer sought one, the special dealer the other. Where one newspaper to the home had been the rule, it became more and more common for the house and office to take from two to five. During the last decade of the nineteenth century and the first decade of the twentieth century, in the struggle for circulation and a general competition, the usual price of the daily newspaper in a large city, which was 4 and 5 cents down to 1880 and from 2 to 3 cents down to 1890, dropped to 1 cent for most of the newspapers having a large circulation, for all but one in Philadelphia, for all but two English morning newspapers in New York in the general field, while in Boston and Chicago 1, 2, and 3 cents was still maintained. At the same time, a corresponding fall took place in the rate charged for the small want advertisement and for the page advertising of business firms, a larger and larger share of which was monopolized by department stores.

CITY	Population	Families	Average daily circulation of newspapers, 1914
Baltimore	558,485	118,851	525,390
Boston	670,585	139,700	2,223,873
Buffalo	423,715	91,328	412,968
Chicago	2,185,283	473,141	2,004,139
Cincinnati	363,591	87,541	393,140
Cleveland	560,663	124,822	651,604
Detroit	455,766	100,356	605,545
New York	4,766,833	1,020,827	3,883,499
Philadelphia	1,549,008	327,263	1,883,118
Pittsburgh	533,905	110,457	536,795
St. Louis	687,029	155,555	767,433
San Francisco	416,912	86,414	564,665

With the opening of the twentieth century the advertising of the American newspaper increased in volume and decreased in the revenue it afforded per column—a process in progress from 1885. At the close of the Civil War the New York *Herald* averaged $100 per column. Half a century later, owing to the decrease in the rate per line for classified or want advertisements, the average revenue per column of the advertising in New York dailies ran from $40 to $70. Public censorship had, however, greatly improved the character of the advertising. In this half century, partly by law and partly by public opinion, lottery and policy notices were excluded. In many States legislation excluded the more flagrant medical advertisements. In 1905 criminal proceedings in the United States courts in New York City, ending with a heavy fine for advertisements which had appeared in the personal column of a New York paper, decreased (from the fear of exclusion from the mails) this class of advertisements in all American newspapers and removed them wholly from most. This was followed by State legislation, beginning in Kansas (1910), creating an official censorship of advertisements of bonds and shares which in many States has excluded dubious proffers of securities, and in all bred greater care. Lastly, each year sees a larger number of States provide in their criminal statutes penalties for misstatement of circulation to secure advertising, for dealers knowingly making misstatements of the character of goods advertised or of the cause for the sale (as, e.g., a fire). Associations of advertisers and advertising agents, local, State, and national, have urged this legislation in safeguarding the good faith of the advertisement, and the movement as a whole records a spontaneous moral advance of the utmost importance to the newspaper and to national life.

Boston was first in the field with *Public Occurrences* (1690), a small quarto sheet, having one page blank. For containing "reflexions of a very high nature," it was suppressed by the Governor of Massachusetts. Next came the Boston *News-Letter* (1704), first conducted by John Campbell, the postmaster. In 1719 it met a bitter rival in the Boston *Gazette;* but with its name changed to the *Massachusetts Gazette and Boston News-Letter*, it grew to be the chief organ of British rule in America down to the evacuation of Boston. In 1721 James Franklin began the *New England Courant.* It suspended in 1727; and two years later Benjamin Franklin, who had been apprenticed to his brother James, established at Philadelphia the *Pennsylvania Gazette*, which he conducted as a weekly till 1765. The *Pennsylvania Gazette* was then merged in the *North American.* Numerous ventures at Boston led to the Boston *Evening Post* (1735), which was ably conducted as an independent journal down to 1775, when it expired. The new Boston *Gazette* (1755) became the voice of the people against England. To it John Adams contributed the *Letters of Novanglus.* The *Massachusetts Spy* (1770) was another brilliant paper on the Revolutionary side. On the day of the battle of Lexington it was removed to Worcester, where, after one short suspension, it continued till 1848. A morning edition, under the name of the Worcester *Spy*, was published from 1845 to 1904. In other Colonies the newspaper had already appeared or was appearing. In 1725 the Colonies had two newspapers, one in Boston and one in Philadelphia. At the outbreak of the Revolution the number had increased to 34. The years immediately following saw, amid many failures and successes, the establishment of two dailies—the *Advertiser* of Philadelphia (1784) and the *Advertiser* of New York (1785).

The oldest New York paper now published is the *Evening Post*, founded in 1801 by Alexander Hamilton, John Jay, and others. To begin with, it was essentially Hamilton's organ. For half a century (1828–78) William Cullen Bryant was editor in chief; during part of this period John Bigelow was associated with him in the ownership and as managing editor, and one of the notable writers was Bryant's son-in-law, Parke Godwin. The next editor was Carl Schurz, who, however, was followed shortly (1883) by Edwin Lawrence Godkin, one of the great figures in American journalism. Horace White became editor in 1899 and Rollo Ogden in 1903. From 1881 Henry Villard owned a controlling interest in the *Post*, and he was succeeded by his son, O. G. Villard. (See the articles on the men mentioned, especially Bryant and Godkin.) The *Post* has long been independent in politics and has been maintained at a high level of news and editorial excellence. Continuing to sell for three cents when all other New York evening papers and most of the morning papers had come down to one cent, it placed reliance upon a select and steady circulation rather than upon wide popularity.

In America, as for most other civilized lands, the years between 1830 and 1860 saw the beginning of the conditions which were to decide the journalism of the future. While in England and France the leading papers of to-day began for the most part at the opening of the century, in America they took shape in this period. Of the leading English morning dailies in New York all but one, the *American*, made its first appearance in the period just noted. The *Sun* (1833), the *Herald* (1835), the *Tribune* (1841), the *Times* (1851), and the *World* (1861) began in these years. The *Courier and Enquirer* (1827) was absorbed by the *World* (1862), and the *Journal of Commerce* (1827) began three years earlier, but shared the same movement. These papers have each gone through changes which show how much in a paper is due to its head and how little to its tradition or to its surroundings. The *Herald*, founded by James Gordon Bennett (q.v.) and continued by his son (1872), has through all the 80 years of joint ownership been marked by its energetic and individual news service, modified for 30 years by the residence of its proprietor abroad and by its Paris edition. The *Tribune* has been divided between two widely different personalities—Horace Greeley (q.v.) for 31 years and Whitelaw Reid (q.v.) from 1872 to 1913, when he was succeeded by his son Ogden Reid (q.v.), who in 1914 projected a new policy. The *Sun* from 1835 to 1867 was a cheap paper of no special note. From 1868 to 1897 Charles A. Dana made the paper the vehicle of a personality with a passion for the mind, for style, and for individual like and dislike, love and hate. It has since been controlled in succession by Paul Dana, W. A. Laffan, and W. C. Reick (1911). The *World* was a political organ under Manton Marble (q.v.) from 1861 to 1876; was neatly written but purposeless under H. W. Hurlbert; and was the creator of a new but most successful type of the journalism of the mass (1883) under Joseph Pulitzer (q.v.) and his heirs. The *Times* was a political power up to the death (1869) of H. J. Raymond (q.v.), a family property to 1893, doing great work early and small later, and from 1896 has been converted by Adolph S. Ochs (q.v.), principal owner and publisher, and C. R. Miller (q.v.), chief editor, into a remarkable example of a paper appealing to the broad, stable, property-holding and property-acquiring multitude of a great and wealthy city, with an editorial power at its highest in its discussion of the War in Europe. The *Press*, organized as a Republican organ, was associated with the extreme principles of that party until the Progressive campaign of 1912. The *Journal of Commerce*, enterprising in its news, has for 70 years past represented commerce.

The *American* sprang from the success of W. R. Hearst (q.v.) in creating the *Journal* (1893), a new type of evening paper precisely suited to a city with a mobile population, a working class traveling daily in the long sluice of a narrow island, and a vast share of readers who knew little English and had in life the transitory relations and emotions of the newcomer.

For 10 years this paper has overshadowed in circulation every other morning or evening paper; and similar papers exist in Boston, Chicago, San Francisco, Los Angeles, and Atlanta owned by their proprietor and creator. This grouping of papers, like the Scripps and McRae ownership of newspapers from Cleveland and Detroit west to California, points to a future common ownership of dailies. The *Mail and Express* and the *Globe*, once the *Commercial Advertiser*, fill a special place. The *Evening World* (1886) and the *Evening Sun* (1887) reflect their morning origin. One-fifth (800,000) of the newspaper circulation of New York is in foreign tongues, and this gives the basis for dailies in a score of tongues, many with as many readers as any in their home lands.

The news of the American Sunday newspaper has for 30 years, from 1885 on, been overshadowed by its supplement. Here illustration, in color or black and white, has been carried farther than elsewhere in the daily press, and the contributors include all the names known to letters and affairs. No greater audience, often reaching 6,000,000 to 8,000,000, has ever been gathered for a writer than in these Sunday supplements which simultaneously publish the same article. These supplements are supplied by syndicates, first organized in 1885, and in large city dailies a supplement has its editor and a separate staff.

Within late years, especially in large cities, the evening newspaper has taken on a character distinct from that of the morning paper. Its news being largely restricted to that which has come in during the day, while the morning paper may draw on the happenings of the preceding 24 hours, there has been opportunity for development along varied lines. It is chiefly in the evening paper that departments and columns conducted by special writers have found welcome. Comment of an editorial nature, while carefully kept out of the news proper, is carried beyond the editorial page by means of interviews on matters of current interest, civic or social. To parallel the bulky Sunday issue of a morning journal the evening paper offers a Saturday supplement containing special news of books, art, music, finance, etc. The first New York morning paper to disregard, and apparently with success, the tradition that a man wants nothing but straight news with his breakfast was the *Tribune* when it entered on a new policy in 1914.

New York still leads the American press, although many consider Chicago a close second. What has been said in this article of the character of journals in the metropolis will, with local modifications, hold true for the other large cities of the country. The small city offers a problem that is distinctly different, and yet certain papers relatively unimportant as regards circulation or locale have gained a national reputation for editorial or other excellence. Among these are the Springfield *Republican* (weekly, 1824; daily, 1844), made famous by Samuel Bowles (q.v.); the Louisville *Courier-Journal* (consolidated in 1867 and edited thereafter by Henry Watterson, q.v.); the Hartford *Courant* (1837); the Emporia *Gazette* (1890); and the Omaha *Bee* (1871). No hard and fast list of the leading papers of the larger American cities could be given; a selection is bound to be arbitrary, while categorical inclusiveness would require the mention of many dailies not of general interest. The following is intended to be roughly representative of the more notable contemporary papers outside New York City: East—Boston *Transcript* (1830), Brooklyn *Eagle* (1841), Philadelphia *Public Ledger* (1836) and *Press* (1857), Baltimore *Sun* (1837), Washington *Post* (1877), Newark *News* (1883); South—New Orleans *Picayune* (1837), Atlanta *Constitution* (1868); Middle West—Cleveland *Plain Dealer* (1841) and *Leader* (1847), Toledo *Blade* (1848), Cincinnati *Enquirer* (1842), Detroit *Free Press* (1835), Indianapolis *News* (1869), Milwaukee *Sentinel* (1837), Chicago *Tribune* (1847), *News* (1875), and *Record-Herald* (1881), St. Louis *Post-Dispatch* (1851) and *Globe-Democrat* (1852), Kansas City *Star* (1880); Pacific Coast—San Francisco *Call* (1856), *Examiner* (1865), and *Chronicle* (1865), Los Angeles *Times* (1881), Portland *Oregonian* (1861), Seattle *Post-Intelligencer* (1867).

New York has never developed the European weekly which appeals to a special class, high or low, as the London *Saturday Review* appeals to the upper and *Reynolds's Weekly* to the laboring classes. Its trade journals, of which the *Iron Age* is a conspicuous example, report the statistics of each industry far better than like European issues. *Collier's* represents the new type of national weekly, covering the country, of which type the *Saturday Evening Post* of Philadelphia has an unprecedented circulation. The *Outlook*, giving affairs and religion the first place; the *Nation*, in a way a weekly issue of the *Evening Post;* the *Independent* (1854) and the *Literary Digest* (1890), information and education; and the *New Republic* (1914), the utterance of a group with the *Saturday Review* and *Spectator* in mind, each in part represents the general weekly abroad. *Life*, *Puck*, and *Judge* are the three comic weeklies, the first national, the other two now local and earlier of a wider audience. *Harper's Weekly* (1857) is the oldest illustrated weekly, but the profuse illustration of the daily holds this field. Religious journals tend to concentrate at New York—the *Churchman* (Episcopal), the *Christian Advocate* (Methodist), the *Examiner* (Baptist), the *Catholic Review*, the *Catholic American*, and many Hebrew weeklies. Sport, art, science, the drama, fashion, and society—each has its own periodicals. The *Literary Digest* presents a résumé of current thought and criticism.

Making of the Newspaper. For a conception of the wonderful progress of the press, one must leave mere annals and enter the workshop. The newspaper such as Defoe edited was nothing more than a brief chronicle of news gathered haphazard, concluding with the advertisement of a quack doctor. Next came the reporter. The special correspondent here and there appeared in the seventeenth century, but he did not gain his place till the Crimean War, and in the United States not till the Civil War. Now every great daily has its hundred correspondents scattered about the globe. This has been rendered practicable by the cable. For saving expense, news agencies have been formed in Europe and America. Reuter's (1858) was the first for England. The Associated Press (see PRESS ASSOCIATIONS) of the United States dates from 1849. Though these serve for the smaller papers, they are to the larger papers only hints to be followed up by their own agents. The telegraph, indispensable for gathering news, has been reënforced by the telephone, which is now finding its way into every village. These new sources for obtaining news have revolutionized the office. The editor who personally superintended the issue of his paper is of the past. There can never be another Greeley or Dana. The editor in chief of certain papers finds no time even to write a leader. The work of making the paper must be divided and subdivided. A city editor directs the reporters in gathering news. A news editor keeps in touch with outside correspondents through the telegraph and the telephone. What pours in from the press associations and a paper's own avenues must be thoroughly sifted by copy editors, who now throw out far more than they put in. For important news articles there are usually special writers. Exchange editors read other periodicals with scissors in hand, clipping what they think will interest the public. Comment on the news of the day is in the hands of a trained corps of editorial writers. All these and other departments receive their general instructions from the editor in chief and managing editor. There are, moreover, editors for finance, commerce, and sport, and critics for music, the theatre, and literature. Many papers also now employ a woman, with a corps of assistants, to gather the news especially interesting to women. Finally, there is the night editor, who makes up the paper, arranging all the articles and the headlines.

TABLE I

CIRCULATION OF PERIODICALS

YEAR	ALL CLASSES		DAILY		WEEKLY		MONTHLY	
	Number	Aggregate copies issued in a year	Number	Circ. per issue	Number	Circ. per issue	Number	Circ. per issue
1909	21,653	11,898,353,613	2,600	24,159,195	15,129	41,283,714	2,491	63,280,535
1904	21,394	9,887,416,515	2,452	19,896,134	15,046	36,732,037	2,500	64,306,155
1900	18,225	8,168,148,749	2,226	15,102,156	12,979	39,852,052	1,817	39,519,897
1890	14,901	4,681,113,530	1,610	8,387,188	10,814	28,954,515	1,734	19,624,038
1880	11,314	2,067,848,209	971	3,566,395	8,633	16,266,830	1,167	8,139,881
1870	5,871	1,508,548,250	574	2,601,547	4,295	10,594,643	622	5,650,843
1860	2,526	927,951,548	387	1,478,435	3,173	7,581,930	280	3,411,959
1850	2,526	426,409,978	254	758,454	1,902	2,944,629	100	740,651

Down to 1814 all papers were printed on hand presses. Then the cylinder press of Koening, run by steam and printing about 1000 copies an hour, was introduced by the London *Times*. In the hands of Sir Rowland Hill, Richard M. Hoe, and other later inventors, the so-called web perfecting press has reached a stage in its development where it will print, fold, paste, and count more than 100,000 copies of eight-page papers an hour. The most recent presses will also print a sheet in six distinct colors. These improvements have been accompanied by quicker means of stereotyping. Plates may be made and clamped on the press within six minutes. In the last decade of the nineteenth century hand typesetting gave way to the linotype machine, which, besides reducing the expense of composition by one-half in New York and by two-thirds in certain other cities, brought the interval between the reception of the latest news and its publication down to less than half an hour. Between 1875 and 1900 paper suitable for print decreased in cost from 12 to 2 cents a pound. New processes in photography have also made easy the rapid reproduction of pictures. The interval between a snapshot and the printed picture is less than one hour. Electricity is displacing steam. The automobile has been pressed into service for getting newspapers on the street; and for wider circulation special trains are employed.

TABLE II

PRODUCT	1909	1904	1899	1890	1880
Publications					
Newspapers and periodicals	$337,596,288	$256,816,282	$175,789,610	$143,586,448	$89,009,074
Subscriptions and sales	135,063,043	111,298,691	79,928,483	72,343,087	48,872,768
Advertising	202,533,245	145,517,591	95,861,127	71,243,361	39,136,306
Newspapers	232,993,094				
Subscriptions and sales	84,438,702				
Advertising	148,554,392				
Periodicals	104,603,194				
Subscriptions and sales	50,624,341				
Advertising	53,978,853				

Statistics. According to a general estimate revised in 1914, the total number of periodicals published in the world was about 60,000, an increase of 10,000 from 1900. This increase has been at least half in Asia. These periodicals are distributed as follows: United States (including all possessions), 23,167; Canada, 1557; Germany, 8500; Great Britain, 9500; France, 3000; Italy, 3000; Austria-Hungary, 3000; Spain and Portugal, 1200; Russia, 1500; Australia, 1000; Greece, 200; Switzerland, 1000; Holland, 1000; Belgium, 1000; Japan, 1800; India, 2000; Turkey, 400; Egypt, 100; Persia, 100; China, 1000; all others, 3000. The total of all issues of periodicals in the United States and its various territories is 23,167, divided as follows: Alabama, 242; Alaska, 25; Arizona, 68; Arkansas, 324; California, 933; Colorado, 401; Connecticut, 156; Delaware, 35; District of Columbia, 83; Florida, 202; Georgia, 358; Hawaii, 36; Idaho, 169; Illinois, 1826; Indiana, 762; Iowa, 944; Kansas, 735; Kentucky, 309; Louisiana, 222; Maine, 139; Maryland, 171; Massachusetts, 672; Michigan, 720; Minnesota, 763; Mississippi, 233;

Missouri, 986; Montana, 253; Nebraska, 640; Nevada, 41; New Hampshire, 110; New Jersey, 379; New Mexico, 123; New York, 2115; North Carolina, 300; North Dakota, 362; Ohio, 1115; Oklahoma, 596; Oregon, 299; Pennsylvania, 1358; Porto Rico, 30; Rhode Island, 55; South Carolina, 168; South Dakota, 412; Tennessee, 311; Texas, 1081; Utah, 115; Vermont, 98; Virginia, 255; Washington, 414; West Virginia, 217; Wisconsin, 685; Wyoming, 89.

In the United States the census gives the most complete statistics obtainable on the circulation and business of American newspapers. Consult also Ayer's *American Newspaper Annual and Directory*. The tables on page 55 give figures for all periodicals reporting. The number failing to report would not alter the results appreciably.

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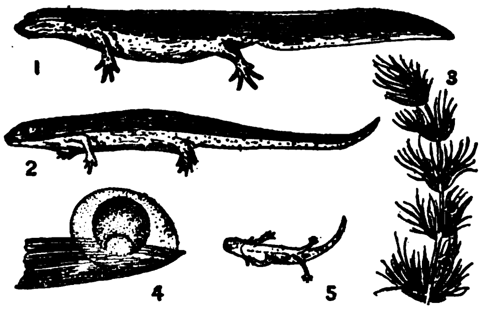
NEW SWE'DEN. The early name of the region between New York and Virginia.

NEWT (ME. *newte, ewte, efte*, by faulty liaison for *an ewte;* a similar instance in English is *nickname*, and reverse changes are *adder, apron, auger, orange, umpire*). A small salamander of the genus *Triton* in Europe and Asia and *Diemyctylus* in North America. The most familiar American newt is the red-spotted one (*Diemyctylus viridescens*). When full grown it is about 4 inches long and is greenish brown above, with a line of vermilion dots on the sides; below it is orange dotted with black. It inhabits ditches and quiet waters, where it feeds voraciously on all sorts of small aquatic animals. With the beginning of warm weather the females begin to deposit their eggs, which may be laid singly during five or six weeks and are attached to the leaves of submerged plants. The young hatch in a fortnight or so and remain in the water, wearing a dull-green coat, until the end of the season, when, having completed their first metamorphosis, their gills disappear, the throat and lungs become adapted to breathing air, and they leave the water. Their color now changes to a rich uniform vermilion with fiery button-like spots along the sides. They are then only 2 or 3 inches long and hide under leaves and within rotten logs, feeding upon small worms and the like, but coming out frequently, especially in the night and wet weather. These little creatures are among the prettiest objects in the American woods. This sojourn on land lasts until the autumn of the third or spring of the fourth season, by which time they have nearly attained to full size and have reached sexual maturity. They then gradually change in color back to the original green and return to the water, where their lungs cease to act, pharyngeal respiration is reëstablished, and they proceed to breed. This species is locally numerous all over the eastern United States. A much larger species (*Diemyctylus torosus*) occurs in the Western States. It is dark brown in color, yellowish beneath, and the tail is provided with fins. It feeds mainly on earthworms.



AMERICAN GREEN NEWT.

1, adult male of *Diemyctylus viridescens* in the green aquatic dress. 2, young newt in the vermilion, terrestrial stage. 3, eggs, attached to a water weed. 4, an egg, enlarged. 5, larva, with external gills.

Of the Old World species the most widely distributed is the crested newt (*Triton cristatus*), which is olive brown with white blotches on the sides, and the males of which, during the breeding season, have serrated crests along the backs. Another well-known species is the marbled newt (*Triton marmoratus*), with which the crested newt hybridizes. All newts prefer a cool and moist situation and hibernate usually in the ground. Some species remain all their lives in the water, while others pass most of their lives on land. They cast their skins from time to time, more frequently when young, and

EUROPEAN CRESTED NEWT.
Male in breeding dress.

the cast skin is eaten. The breeding habits of all resemble those of the American species. Consult: Gage, "Life History of the Vermilion-Spotted Newt," in the *American Naturalist* (Philadelphia, 1891); Jordan, "Habits and Development of Newts," in *Journal of Morphology*, vol. viii (Boston, 1893); Sherwood, *Salamanders Found in the Vicinity of New York City* (New York, 1895); Hans Gadow, *Amphibia and Reptiles* (London, 1901); R. L. Ditmars, "Batrachians of the Vicinity of New York City," in *American Museum of Natural History Guide Leaflet* (New York, 1905).

NEW TESTAMENT. See BIBLE.

NEW TESTAMENT CHRONOLOGY. The determination of the dates of the chief events of the New Testament period of Christianity is beset by many difficulties. The New Testament writers were not interested primarily in chronology. Luke alone dated a few of the chief events. Once the relative dates of a short series of events are noted by Paul. (Gal. i. 15–ii. 1.) In no case is reference made to any one of the eras then commonly used.

The chief problems with which New Testament chronology is concerned are the dates for the life of Christ, especially those of his birth and of his ministry, and the dates to be assigned to the chief events of Paul's career from his conversion to his death. The dates of a few other important events are determined independently of any reference to Paul.

CHRONOLOGY OF THE LIFE OF JESUS

I. **Date of the Birth of Jesus.** (*A*) *Year.*—For this we are dependent mainly on the statements in the Gospels of Luke and Matthew.

DATA IN THE GOSPEL OF MATTHEW

1. Jesus was born before the death of Herod the Great, but presumably not very long, i.e., not much more than two or three years, before that event. Such is the implication of Matt. ii. 1 and 16. Now, since Herod's death took place early in the year 4 B.C. (our present calendar is based on the erroneous calculations of the sixth-century monk Dionysius Exiguus), it follows that, according to Matthew, Jesus was born not later than 6 B.C. and probably a year or so earlier.

2. If the story of the star of the wise men (Matt. ii. 1) is based on a true tradition, it is probable that the star was some unusual stellar appearance such as a conjunction of planets. The astronomer Kepler calculated that a conjunction of Jupiter and Saturn occurred 7 B.C. and was visible in Palestine. So far as this has value it confirms the conclusion stated under No. 1 above.

DATA IN THE GOSPEL OF LUKE

The birth of Jesus took place at the time of a general census or enrollment (Gk. ἀπογραφή) of the Roman Empire ordered by Augustus Cæsar and carried out in Palestine when Quirinius was governor of Syria, this being the first census of the kind. (Luke ii. 1–2.)

The accuracy of this definite statement has been seriously questioned, partly because little has been known hitherto of the census system of Augustus and partly because what was known of Quirinius' career seemed to make it impossible to hold that he was governor of Syria during the reign of Herod the Great. (Luke i. 5.) It was known from Josephus (*Ant.*, xvii, 13, 5; xviii, 1, 1) that Quirinius was governor of Syria in 6 A.D. and that a census of Judæa was taken at that time (referred to by Luke himself in Acts v. 37). It was therefore thought that in the Gospel Luke must have erred both as to the date of Quirinius and in speaking of that census as the "first" one, but recent archæological research has made it almost certain that Luke's statement is perfectly accurate. From papyri documents recently recovered in Egypt it is now known that Augustus instituted a periodical census taking, that the first general census was that of the year 9–8 B.C., and that thereafter a census was made every 15 years (14 according to our mode of reckoning). The census of 6 A.D. mentioned by Josephus and in Acts v. 37 was therefore the *second* general census, not the first. And while it remains true that Quirinius was governor of Syria in 6 A.D., it is now practically certain from an inscription recovered in 1912 at Antioch of Pisidia by Prof. W. M. Ramsay that he was also governor of Syria earlier, about 10–8 B.C. From other sources it is known that his immediate successor was Saturninus, who was governor from about 8 to 6 B.C., and it is probable that he succeeded Quirinius while this census of 9–8 was being taken, the year 9–8 being the last year of Quirinius' term and the first of Saturninus'. This explains the apparent discrepancy between Luke and Tertullian, who, writing in the third century, says that the census was under Saturninus. The papyri also support Luke's position that for enrollment purpose it was necessary for people to return to their proper (legal) home. It is altogether probable, therefore, that Luke's narrative is accurate in every essential point, and consequently the year of Jesus' birth was 8–7 B.C., which agrees with the data in Matthew.

(*B*) *Month and Day of Jesus' Birth.*—Regarding these nothing is certainly known. The present calendar date, December 25, was fixed upon not earlier than the third century and then arbitrarily rather than on the basis of genuine tradition.

II. **Dates for the Ministry of Jesus.** (*A*) *Jesus' Age when he Began to Teach.*—The one statement in the Gospels touching this point is Luke iii. 33, which says that when Jesus began his ministry he was "about 30 years of age." This is not definite, and probably means no more than that he was between 30 and 40, or, as we say, "in the thirties." The Jews appear to have had a theory that a teacher should be at least 40 years of age, and the statement in Luke may have reference to that theory. The statement is too indefinite to be of chronological value.

(*B*) *Length of the Ministry.*—This is only vaguely indicated in the Synoptic Gospels, but is, apparently, set forth more precisely in the Fourth Gospel.

The outline of Jesus' ministry as given in Mark, which is also the basal outline of both Matthew and Luke, is briefly as follows:

1. The beginning, including the early preaching of John the Baptist and the baptism of Jesus by John, with the following period of temptation. (Mark i. 1–13.)

2. A period (length not indicated) at the close of which John is imprisoned. (Mark i. 14; John iii. 24.)

3. The ministry in Galilee. (Mark i. 14–ix. 50.) Quite vaguely Mark indicates that this comprised two parts: first a time of quite uninterrupted popularity spent almost continuously near the Sea of Galilee (i. 14–vii. 23), and then a time when he was frequently in retirement in places remote from the sea (vii. 24–ix. 50).

4. A ministry in Judæa and Peræa which closed with the fateful journey to Jerusalem (chap. x).

5. Finally, the last week in Jerusalem, closing with the crucifixion, which took place, according to Mark, on Friday, the day after the Passover (which Jesus had celebrated with his disciples by the Last Supper). No essential change is made by Matthew or Luke in this general scheme of the ministry.

But the Synoptics give no specific indication of the relative length of these periods or of the ministry as a whole. Only one Passover is expressly mentioned, and that at the very end of the ministry. It is not surprising, therefore, that a widespread impression prevailed at one time that Jesus' ministry lasted but one year, although it cannot be proved that such was the view of the Synoptic writers themselves. (Luke iv. 19 should not be interpreted chronologically.) However, two indirect chronological indications are found in Mark: the incident of the plucking of the ears of grain (ii. 23), which must have occurred shortly before the grain harvest time (in Palestine in April or May), and that of the multitude seated on the green grass (vi. 39), again an indication of the spring or early summer season. It is probable, therefore, that the time covered by the event recorded in Mark between ii. 23 and vi. 39 was about a year—from spring to spring—or from one Passover season to another. Between vi. 39 and the last Passover another year intervened. Consequently Mark's Gospel probably indicates a ministry of something over two years.

The Fourth Gospel speaks positively of at least three Passovers: the first (ii. 13 ff.) spent at Jerusalem, another (vi. 4) in Galilee in exact agreement with Mark vi. 39 as to the time of the year and the incident concerned, and third, the last one at the close of the ministry (xii. 1 ff.). At v. 1 the Fourth Gospel mentioned "a feast," which, being unnamed, was probably not a Passover. The statement in iv. 35 is too indefinite to be of chronological value. Both the Synoptics and the Fourth Gospel therefore apparently indicate that the ministry lasted between two and three years, the distribution as follows:

1. The beginning (see above), up to the first Passover, length indeterminate, but probably not over six months.

2. A brief ministry to Jerusalem and Judæa (John ii. 13–iv. 42), from the first Passover on, for about two months.

3. The ministry in Galilee, from early summer to the Feast of Tabernacles in the fall of the following year (John iv. 43–vii. 9 = Mark i. 14–ix. 50 = Matt. iv. 12–xviii. 35 = Luke iv. 14–ix. 50), a period of about 16 months.

4. The ministry in Peræa and Judæa (John vii. 10–xi. 57 = Mark x = Matt. xix. 1–xx. 34 = Luke ix. 51–xix. 27), from Tabernacles to the following Passover, about six months.

5. The last week, Passover season, closing with the crucifixion on the day of the Passover. (According to John xviii. 28.)

If the evidence of the Fourth Gospel be rejected as worthless, the scheme suggested above loses its chief support, although it may still be correct.

(*C*) *Dates for the Beginning and the End of the Ministry.*—Knowing the probable length of the ministry, if we can be sure of the date of either extreme, the date of the other may easily be fixed, at least within the limits of a year. Unfortunately the dates here are difficult to control.

(1) The Date of the Opening of the Ministry.—The one explicit statement concerning this is Luke iii. 1–2, that in the fifteenth year of Tiberius Cæsar the word of God came to John the Baptist, resulting in his remarkable public work. While John's popularity was at its height Jesus was baptized by him and began his public career. Two questions are here involved: (1) When was Tiberius' fifteenth year? and (2) How long had John been preaching when Jesus came to him for baptism?

(*a*) Tiberius' fifteenth year.—Tiberius succeeded Augustus on Aug. 19, 14 A.D. His fifteenth year was therefore, in view of the ancient method of counting both extremes, 28 A.D. It is possible, however, that as Tiberius was associated with Augustus in 11–12 A.D. or, as some hold, in 13 A.D. and actually exercised the Imperial power from that time in the East, Luke may have reckoned from 11–12 A.D. or 13 A.D. instead of 14 A.D., especially as the method of reckoning time by the regnal years of the Emperor was one to which writers were still somewhat unaccustomed. In that case the fifteenth year of Tiberius would be 25–26 A.D. (or 27 A.D.), and "about 30 years" previous would be 5–4 B.C. (or 3 B.C.). This gives no difficulty if, as we have seen, "about 30 years" means only "in the thirties"; but in any case we get no assured results.

(*b*) How long John the Baptist had been preaching before Jesus began his ministry is also uncertain. To have gained the popularity implied must have taken a few months at least. On the basis of these data the years 25–26, 27, and 28 are all possible dates for the beginning of Jesus' public work.

(2) Date of the Crucifixion.—(*a*) The day of the week.—The four Gospels agree that Jesus was crucified on Friday, but the Synoptics hold that this Friday was the day *after* the Passover, while the Fourth Gospel teaches that it was the Passover day. As the Passover always came on the fourteenth of the (lunar) month Nisan (cf. Ex. xii. 1 ff.), according to the Fourth Gospel Jesus was crucified on the fourteenth of Nisan, while according to the Synoptics the crucifixion was on the fifteenth. (Cf. John xviii. 28 with Mark xiv. 12 ff.) There seems to be no way of reconciling this disagreement, and as the trend of recent opinion is strongly in favor of the evidence of the Fourth Gospel on this point, we shall take it as probable that Jesus was crucified on the day of the Passover and that the fourteenth of Nisan that year fell on Friday.

(*b*) The year of the crucifixion.—The problem now is: In what year, of the years possibly involved, did the fourteenth of Nisan fall on Friday? The difficulty in solving this problem lies in the fact that the Passover is a *movable* feast, always occurring on the fourteenth of the *lunar* month Nisan. As the average length of a lunar month is only about 29½ days, the place of the lunar months in relation to the solar months is constantly shifting, necessitating a periodical readjustment of the lunar to the solar year. The rule was that the fifteenth of Nisan, i.e., the full moon, must always come while the sun is in the constellation Aries, i.e., in the solar month-period beginning with the spring equinox, which is, of course, practically a fixed time, but might be designated in different ways. The present date, March 21, was not fixed upon until the fourth century A.D. Earlier than this there was much uncertainty, and it is probable that March 18 was the date usually given to the spring equinox in the East, although the Julian calendar from the first had made March 25 the date.

It is evident that, if a table could be constructed showing the dates of the first of Nisan for the year involved, as the first day of that month was actually fixed by the Jews of the time of Christ, it would be comparatively easy to determine on what year Passover fell on Friday. But the method of the Jews in determining the first day of the month makes all such computations uncertain. The Jews probably fixed the first day of Nisan by actual observation, i.e., the first evening (of the evenings in question) when the new moon was *visible* was the one to be counted as marking the first day of the month (the Jewish day extended from evening to evening). But the new moon's visibility always depends (1) on its apparent position relative to the horizon and the sun and (2) on the state of the atmosphere, whether cloudy or clear. The first of these points may be determined astronomically in connection with observations, and a table constructed showing the actual phases of the new moon for the years and months in question. But as to the second point, the weather conditions on the particular evening involved, there must always be uncertainty in the absence of definite historical information. The investigations of C. H. Turner, J. K. Fotheringham, and B. W. Bacon seem to have reduced the whole question to a choice between the years 29 and 30 A.D., Mr. Turner deciding for Friday, March 18, 29 A.D., as the fourteenth of Nisan, the other two scholars fixing Friday, April 7, 30 A.D., as the correct date. At present all that can be said is that the evidence drawn from calculations of the moon's phases seems to favor 30 A.D. a little more strongly than it does 29 A.D. as the year of the crucifixion (i.e., as the year on which the fourteenth of Nisan fell on Friday). On the other hand it is also possible—we shall not say, with Mr. Turner, probable—that a trustworthy Christian tradition dates the crucifixion in 29 A.D.

Summing up, the dates for the Gospel events may be tabulated thus:

9–8 B.C.	Birth of John the Baptist.
8–7 B.C.	Birth of Jesus.
27 (or 26) A.D.	The public appearance of John the Baptist. Some months later the baptism of Jesus by John.
28 (or 27) A.D. (spring)	The first Passover of Jesus' ministry and a brief ministry in Judæa. (John ii. 13 ff.)
28 A.D. (summer)–29 A.D. (fall) (or 27 A.D. (summer)–28 A.D. (fall))	The 16 months' ministry in Galilee.
29 A.D. (fall)–30 A.D. (spring) (or 28 A.D. (fall)–29 A.D. (spring))	Six months' ministry in Judæa and Peræa.
30 A.D., April 7 (or 29 A.D., March 18)	Crucifixion on Friday the fourteenth of Nisan.

THE CHRONOLOGY OF THE APOSTOLIC AGE

Because of our rather meagre information concerning most of the details of the apostolic age the problem of its chronology has to be decided mainly on the basis of the notice in Acts of the career of Paul, the only Apostle of whose work we have any extended knowledge.

The record in Acts of Paul's work may be outlined as follows:

1. His conversion to Christianity near Damascus (ix. 19).
2. His early experience as a Christian worker up to the time when he was brought by Barnabas to Antioch, where he soon became prominent (ix. 20–30, xi. 25–26).
3. A visit to Jerusalem with Barnabas, with a contribution, in view of a predicted famine (ix. 27–30).
4. The first missionary journey, in Cyprus and central Asia Minor (xiii–xiv).
5. The Council of Jerusalem to determine the status of Gentile converts (xv. 1–29).
6. The second missionary journey in Asia Minor, Macedonia, and Greece, returning to Antioch (xv. 40–xviii. 22).
7. The third missionary journey, with headquarters at Ephesus for over two years, followed by a farewell visit to the Macedonian and Grecian churches, closing with a journey to Jerusalem (xviii. 23–xxi. 17).
8. Arrest in Jerusalem and a two years' imprisonment at Cæsarea under Felix the Roman procurator (xxi. 18–xxiv. 26). His appeal to Cæsar granted by Felix's successor, Festus, very soon after he took office (xxiv. 27–xxvi. 32).
9. Voyage to Rome, begun in the fall and ending the following spring (xxvii–xxviii. 16).
10. Two years in Rome as a prisoner (xxviii. 17–31).

Of these No. 3 comes immediately before the account of the death of Herod Agrippa I, which took place in 44 A.D. The famine predicted is said (xi. 28) to have taken place "in the reign of Claudius" (41–54 A.D.), but the year is not specified. As the mission of Paul and Barnabas to Jerusalem with aid was due to the prediction, it may have anticipated the actual pinch of the famine. Now there was a famine in Judæa about 46. (Cf. Josephus, *Ant.*, xx, 5, 2.) Presumably Paul's visit to Jerusalem was not later than this and therefore sometime near 44 A.D., the date of the next event in Acts.

No. 6 was identical in part with two events of public character: (1) the decree of Claudius Cæsar, covering the departure of the Jews from Rome, which had been issued shortly before Paul arrived in Corinth. (Acts xviii. 3.) According to Ramsay, following Orosius, the decree should be dated near the end of the year 50 A.D. According to Schürer, who doubts that the decree meant expulsion, 49 A.D. is the correct date. Either date would agree with Luke's statement and allow Apollos and Priscilla to have arrived at Corinth about 50 A.D. (2) The proconsulship of Gallio (q.v.), who was in office when Paul was in Corinth. (Acts xviii. 12.) Fortunately this often-disputed date is no longer doubtful. An inscription recently discovered at Delphi by E. Bourget and later published by Deissmann (*Paulus*, pp. 159 ff.) proves that Gallio was proconsul of Achaia in the year 51–52 A.D. (from about June to June), and as the case of the Jews against Paul would have been brought as soon as possible after Gallio's arrival, it is almost certain that Paul left Corinth in the fall of 51 A.D., i.e., soon after the dismissal of the case against him by Gallio. (Cf. Acts xviii. 18.) Consequently Paul's 18 months' (Acts xviii. 11) stay in Corinth extended from 50 A.D. (spring) to 51 A.D. (fall). The fall of 51 A.D. may therefore be taken as a fixed date for Pauline chronology, in the light of which much of the literature on the subject is now rendered obsolete.

No. 7 gives us only one item of chronological value, the reference to the days of the week following the seven days' Feast of Unleavened Bread, while Paul was on his way to Jerusalem. (Acts xx. 6–7.) Paul sailed from Philippi after the Day of Unleavened Bread and arrived at Troas in five days, where he stayed seven days, leaving on Monday morning. From these data it might seem possible to determine the day of the week on which Passover (always the day preceding Unleavened Bread) fell that year, and then find by a table in what year Passover fell on the given day. Prof. B. W. Bacon considers it as good as proved by this method that 55 A.D. was the year in question; but such a reckoning is uncertain, and it seems wiser to lay no special emphasis on this point.

No. 8 refers to one important political event, the arrival of Porcius Festus as Felix's successor two years after Paul's arrest. The facts, regarding which ancient testimony (Tacitus, Josephus, etc.) is somewhat conflicting, appear to be these: Felix was appointed by Claudius about 53 A.D., the appointment being confirmed by Nero on his accession (October, 54 A.D.). Felix married Drusilla not earlier than 54 A.D. (cf. Josephus, *Ant.*, xx, 7, 2 with 8, 4), and this marriage had taken place when Paul was arrested. (Cf. Acts xxiv. 24.) Shortly after his arrest Paul addressed Felix as having been "for many years" the judge of the Jews. Paul's arrest, therefore, could not have been much earlier than 56 A.D., possibly in 55 A.D. No known facts regarding Felix or Festus his successor are contradictory to this. Provisionally we may take 56 (possibly 55) as the date of Paul's arrest and 58 (possibly 57) as that of the accession of Festus and of the reference of Paul's case to the Emperor.

Turning now to Paul's own words in Galatians (i. 15–ii. 10), we find the following items: (1) Paul's conversion; (2) a sojourn in Arabia, length not stated; (3) a return to Damascus, length of stay here not stated; (4) then "after three years" (or two, as we should say) a visit to Jerusalem to see Peter, with whom he stayed 15 days; (5) finally "after 14 years" (= 13) another visit to Jerusalem with Barnabas and Titus (ii. 1–10), which, it is here assumed, was identical with the visit of Acts xv (No. 5 above) and not with the earlier visit of Acts xi. 27–30, which probably was of no significance for the point Paul was dealing with in his Epistle to the Galatians.

Now, since the second missionary journey (No. 6 above) was undertaken very soon after the council of Acts xv (cf. xv. 40) and in the course of this journey Paul arrived in Corinth, after much time spent in Asia Minor and Macedonia, in the spring of 50 A.D., the council could not have been later than the spring of 49 A.D. Working backward 14 years (= 13 as counted by us), on the basis of Gal. ii. 1 we get 36 A.D. as the date for Paul's visit with Peter in Jerusalem, unless we consider that the "14 years" include the "after three years" of i. 18, in which case Paul's conversion would be dated about 36 A.D. and his visit to Peter about 38 A.D. Either view agrees well enough with Paul's words in 2 Cor. xi. 32 f., probably referring to the incident mentioned in Acts ix. 24, which must have taken place when Aretas was in control of Damascus and therefore after 35 A.D. (Cf. Schürer, vol. i, p. 737 and note.) On the whole it seems better to take Gal. ii. 1 as meaning 14 (= 13) years after the visit to Peter, and thus date Paul's conversion about 34 A.D.

As to the date of the death of Paul, all that can be said here is that the most ancient tradition of the Church teaches that Paul suffered martyrdom at Rome under Nero, which probably took place in the cruel persecution by which Nero sought to divert from himself the suspicion of having burned Rome, i.e., in 64 or 65 A.D.

On the basis of the results thus reached we may construct the following table:

30 (or 29?) A.D.	Pentecost, first preaching by the Apostles. (Acts ii.)
29–34	Christianity organised and becomes prominent in Jerusalem. (Acts ii–vi.)
34	Stephen martyred. Persecution extends Christianity outside Jerusalem. Paul converted at Damascus. (Acts vii–ix; Gal. i. 13 ff.)
34–36	Paul in Arabia. His return to Damascus and escape thence. He visits Jerusalem and goes thence to Tarsus. (Gal. i. 17–21; 2 Cor. xi. 32; Acts ix. 30.)
34–44	Rapid extension of Christianity through Palestine, Phœnicia, and Syria, as far as Antioch. (Acts ix–xi.)
44	Execution of James, the brother of John. Peter escapes from Herod Agrippa I, who soon after dies at Cæsarea. (Acts xii.)
45–46?	Paul and Barnabas carry a contribution to Jerusalem. (Acts xi. 27–30.)
47 (spring)–48 (fall)	First missionary journey of Paul. (Acts xiii–xiv.)
49 (Pentecost?)	The apostolic council in Jerusalem. (Acts xv; cf. Gal. ii. 1–10.)
49	Barnabas and Mark go to Cyprus. (Acts xv. 35–39.)
49 (fall)–51 (summer)	The second missionary journey. (Acts xv. 49–xviii. 22.) Paul arrives at Corinth in the spring of 50 A.D. 1 and 2 Thessalonians written from Corinth in 50 and 51 A.D. Departure from Corinth in the fall of 51 A.D.
51 (late fall)–55 or 56 (spring)	Third missionary journey. (Acts xviii. 23–xxi. 17.) 1 Corinthians written from Ephesus in 53–54 A.D. 2 Corinthians written from Macedonia late in the spring of 55 A.D. Galatians written from somewhere on the journey to Corinth in the summer or fall of 55 A.D. Romans written from Corinth in 55–56 A.D.
56–58 (55–57?)	Paul held in Palestine, most of the time in Cæsarea. (Acts xxiii. 1.)
58 (57?) (fall) – 59 (58?) (spring)	Paul's voyage to Rome.
59–61 (58–60?)	Two years' imprisonment in Rome. Epistles to Philippians, Colossians, Philemon, and Ephesians written.
61 (60?)–64	Missionary journey to Spain. Revisits the East. 1 Timothy and Titus written.
64	Again imprisoned in Rome. 2 Timothy written.
64 (65)	Executed by order of Nero. According to tradition, Peter also was martyred at Rome about the same time. James, the brother of the Lord, martyred at Jerusalem between 62 and 66 A.D.
70	The capture of Jerusalem by the Romans under Titus. The Palestinian Christians scattered.
65 (?)–90 (?)	The Apostle John in Asia Minor (Ephesus).

Bibliography. Of the large body of literature bearing on New Testament chronology, particular mention may be made of the following: Karl Wieseler, *Chronologische Synopsis der vier Evangelien* (Hamburg, 1843; Eng. trans., 2d ed., London, 1878); id., *Chronologie des apostolischen Zeitalters* (Hamburg, 1848); id., *Beiträge zur richtigen Würdigung der Evangelien* (Gotha, 1869); Thomas Lewin, *Fasti Sacri, or a Key to the Chronology of the New Testament* (London, 1865); C. L. Ideler, *Handbuch der mathematischen und technischen Chronologie* (2d ed., 2 vols., Berlin, 1883); Emil Schürer, *Geschichte des jüdischen Volkes im Zeitalter Jesu Christi* (4th ed., 4 vols., Leipzig, 1901–11; Eng. trans., 5 vols., New York, 1896); Sir W. M. Ramsay, *Saint Paul the Traveller and the Roman Citizen* (New York, 1896); Adolf Harnack, *Chronologie der altchristlichen Litteratur* (Leipzig, 1897); Sir W. M. Ramsay, *Was Christ Born in Bethlehem?* (New York, 1898).

Of more recent literature, the most thorough treatment of the whole subject is that of C. H. Turner in his exhaustive article in *Hastings' Dictionary of the Bible*, vol. i (New York, 1899). With this may be named the corresponding article in the *Encyclopædia Biblica*, vol. i (ib., 1899), by Von Soden. Prof. B. W. Bacon's vigorous and illuminating discussion of various points will be found in articles in the *Expositor* (London, 1898–1900) and in his *The Fourth Gospel in Literature and Debate* (New York, 1910), with which should be compared James Drummond, *The Character and Authorship of the Fourth Gospel* (London, 1903). Prof. W. M. Ramsay's valuable contributions on the recently discovered inscription concerning Quirinius will be found in the *Expositor* (London, 1896–97, 1900, 1908, and 1912). Other important discoveries are by C. Erbes, *Die Todestage der Apostel Paulus und Petrus und ihre römischen Denkmäler* (Leipzig, 1899); Emil Schürer, in the fourth German edition of his *Geschichte* noted above, not translated, contains much that is not in the second edition—of special value is the Beiträge iii to vol. i; Carl Clemen, *Paulus*, vol. i (Giessen, 1904); J. R. Harris, in the *Expositor* (London, 1905); Willy Staerk, *Neutestamentliche Zeitgeschichte* (2 vols., Leipzig, 1907), containing a bibliography; Theodor Taher, "Chronological Survey," in *Introduction to the New Testament*, vol. iii (New York, 1909); Kirsopp Lake, article "Christmas," in *Encyclopædia of Religion and Ethics*, vol. iii (ib., 1911); A. Deissmann, *Paulus* (Tübingen, 1911; Eng. trans., London, 1912); Hans Lietzmann, "Ein neuer Fund zur Chronologie der Paulus," in *Zeitschrift für wissenschaftliche Theologie*, vol. liii (Leipzig, 1911).

NEW THE'ATRE, The. A theatre in New York City, so called during the two seasons of its occupancy by the New Theatre Company (1909–10, 1910–11). It was designed to be the permanent home of a repertory stock company acting the best classic and modern plays, the plan being to have one-third of the repertory classical. The inception is to be credited to Heinrich Conried (q.v.), who interested in his scheme a number of New York gentlemen, most of whom were prominently connected with the support of the Metropolitan Opera. The 30 who furnished financial support were known as the founders. Each subscribed $35,000 at the start. Their purpose was the establishment of a theatre which, broadly speaking, should resemble the Comédie Française of Paris. The first, and only, director was Winthrop Ames (q.v.). Granville Barker (q.v.) had been offered the position, but declined. George Foster Platt and Louis Calvert were engaged to supervise the productions, Hamilton Bell as art director, and Elliott Schenck as musical director. A building, designed by Carrère and Hastings, was erected on Central Park West. Architecturally it was, and remains, one of the handsomest structures in the city. Luxuriously appointed, equipped with the most modern stage devices, capable of seating 2300 persons, the New Theatre was opened Nov. 6, 1909, with impressive ceremonies and apparently under the most favoring auspices. However, a serious defect in the acoustics became apparent at once, and this was only partly remedied by the installation of a sound-deflecting bell. Other difficulties began to present themselves: the theatre was a mile above the centre of the theatre district, and although the audiences were large, they were certainly not large enough to fill so large an auditorium; then, too, the venture proved exceedingly costly, not only in the initial outlay required, but in its upkeep. Financially it was hardly the success that had been hoped for.

Several Shakespearean plays were given, by far the most notable presentation being that of *The Winter's Tale*. On the whole the company did its best ensemble work in some of the modern plays, like Maeterlinck's *The Blue Bird* and *Sister Beatrice*, Galsworthy's *Strife*, and Edward Sheldon's *The Nigger*. A poetic drama of distinction was Josephine Preston Peabody's *The Piper*. In most cases the stage settings were of very high quality. After the first season changes were made in the seating of the theatre, the attempt to produce grand opera occasionally, in coöperation with the Metropolitan, was given up, and an effort was made so to rejuvenate the undertaking that it could be continued. During the summer the company went on tour. At the end of the second season it was found impracticable to plan for a third. Subsequently the New Theatre building was leased to other managers, who changed the name to the Century Theatre. Consult *The New Theatre* (New York, 1909), which gives the names of founders, officers, etc., with biographical sketches and portraits of the company, and *The New Theatre, Season 1909–10* (ib., (1910), for titles of plays, dates of production, casts, etc. Both the foregoing were privately circulated by the management. Consult also the magazines of 1909–11, especially W. P. Eaton, in the *Atlantic Monthly*, vol. cv (Boston, 1910), and John Corbin, in the *World's Work*, vol. xxii (Garden City, N. Y., 1911).

NEW THEOLOGY, The, or New Divinity. A term often applied in the last quarter of the last century to a movement represented by Andover Theological Seminary and embodied in a small volume by its professors, called *Progressive Orthodoxy*, published in 1886. It became clear finally that the movement was larger and deeper than this, and the term is now generally applied to those forms of theological effort which attempt to incorporate fully in theology the approved results of modern thinking, especially such as are derived from the general theory of evolution. The new theology cannot be said to be a consistent system of thought, nor uniform among its various advocates and promoters. It is rather a tendency than a school of thought. There are left and right wings. But with various differences of emphasis and of the completeness with which the separate results of the new methods are adopted, the new theology may be said to agree in the following points: the acceptance of evolution as the method of divine providence in the spiritual sphere as well as in the material; the employment of the methods of the higher criticism in the discussion of the origin and authority of both Testaments; the rejection of verbal inspiration and the substitution for it of greater, or sometimes exclusive, emphasis upon revelation (see INSPIRATION); a subjective view of the atonement; increased emphasis upon ethics in distinction from dogmatics and upon sociological study and work; restatement of positions in eschatology, with a strong tendency to universalism. The tendency of the school is to minimize the supernatural (miraculous) and in the left wing to exclude it. Every important denomination of Christians has some share in this movement. In England, for a time after 1908, the term was used to denote the phase of thought represented in the book of that title by R. J. Campbell. This use, however, was only temporary.

NEW THOUGHT. The name commonly given to the mental attitude which affirms the creative power of spirit and as a corollary the origination and control of conditions and circumstances by mental causes. Such is the definition to be inferred from the latest and most authoritative writers on the subject. It reverses the traditional order of thought, which with the generality of mankind starts with conditions as causes and reasons from them to their supposed effects. New Thought is not new so far as concerns the truths on which it is founded, but it expresses a new point of view for the many in the conduct of life. With the few its principles have been immemorially familiar and have been transmitted from age to age. As a philosophical system it should be distinguished from any of its practical applications. For example, Mental Science (q.v.) and other curative methods defined as metaphysical healing are based upon the principles of New Thought, although in the widest acceptation of the respective terms, Mental Science and New Thought have the same meaning. Theories attracted towards the name of the system as a rallying centre have been tried by the struggle for survival, with the result of bringing into view a number of thinkers through whom New Thought has attained a more assured position and an optimism more instructed than that of its earlier speculation. In its recognition of spiritual law and its treatment of spiritual facts it follows the inductive and experimental method of physical science. It does not, like Christian Science, deny the existence of matter, but affirms the ultimate reality of spirit. Philosophically it is a development of Idealism (q.v.), and in America the writings of Ralph Waldo Emerson best express its spirit and the possibilities of its application.

The New Thought theory of metaphysical healing is referred to in the article on Mental Science. Phineas Parkhurst Quimby (q.v.) was its first practitioner in America. John Bovee Dods (1795–1852), an American contemporary of Quimby, also studied mental healing and wrote several books, concluding that disease originated in the electricity of the nerves and was curable by a change of belief. It is important to recall that the theories of Quimby and other similar investigators were not known as Mental Science until about 1886, and that the name was then adopted partly to express the opposition of many to Christian Science. In like manner the name of New Thought became current about 1906, largely as a protest against the exclusive designation of Mental Science as a method of cure. It was intended to include not only mental healing but a philosophy of life and conduct, demanding on the practical side a vigorous opposition to the control of individual independence, whether by a churchly form of organization or by a particular statement of belief. The adherents of the system account in this way for its individualistic character and lack of organization, while they also contend that it facilitates an appreciation of all that is liberal and humanizing in other systems. An examination of the many New Thought books and pamphlets discloses great variety in the point of view, but no less confirms the claim that a consistent hostility to materialism is maintained. The aim manifestly is to exalt the inner world above the world of sense.

It is difficult to make a reliable estimate of the numbers who profess New Thought. According to some of its leaders it is neither possible nor desirable to state its creed, since it includes members in the various churches and gathers strength by its optimistic view of life rather than by the efforts of a propaganda. In 1915 there were said to be between 300 and 400 centres of its teaching in the United States and Canada. It is taught also in many English cities and towns, and in the larger cities of Europe. A number of widely circulated periodicals expound its principles, and its literature is steadily increasing. There is an International New Thought Alliance, with headquarters in London, England, or some other large city designated as the place of meeting.

Bibliography. H. W. Dresser, *Power of Silence* (2d ed., New York, 1904); Henry Wood, *New Thought Simplified* (Boston, 1904); Thomas Troward, *Edinburgh Lectures on Mental Science* (New York, 1906), a work of great ability; H. W. Dresser, *Philosophy of the Spirit* (ib., 1908); Thomas Troward, *Doré Lectures* (ib., 1909); R. W. Trine, *In Tune with the Infinite* (ib., 1910); W. S. Sadler, *Philosophy of Faith and Fear* (Chicago, 1912); R. W. Trine, *New Alinement of Life* (New York, 1913); Thomas Troward, *Bible Mystery and Bible Meaning* (new ed., ib., 1913); E. H. Williams, *Increasing your Mental Efficiency* (ib., 1914); S. D. Kirkham, *Philosophy of Self-Help* (ib., 1915). See also AUTOSUGGESTION; CHRISTIAN SCIENCE; FAITH CURE; HYPNOTISM; MENTAL SCIENCE: PSYCHOTHERAPEUTICS.

NEWTON, nū′ton. A city and the county seat of Jasper Co., Ill., 50 miles southwest of Terre Haute, Ind., on the Embarras River and on the Illinois Central Railroad (Map: Illinois, H 8). The surrounding region is well adapted to farming and fruit growing, and there are also coal deposits. The manufactures include ice, concrete blocks, brooms, furniture, tile and brick. The city owns and operates its water works and electric-light plant and has a beautiful natural park. Pop., 1900, 1630; 1910, 2108.

NEWTON. A city and the county seat of Jasper Co., Iowa, 35 miles east by north of Des Moines, on the Minneapolis and St. Louis and the Chicago, Rock Island, and Pacific railroads (Map: Iowa, D 3). It has a Carnegie library and fine courthouse building. The city is surrounded by a district engaged in farming and stock raising, and manufactures agricultural machinery, foundry and machine-shop products, gas engines, show cases, washing machines, automobile accessories, road-making machinery, brick and tile, flour, etc. The water works and electric-light and gas plants are owned by the municipality. Pop., 1910, 4616; 1915 (State census), 5250.

NEWTON. A city and the county seat of Harvey Co., Kans., 27 miles north of Wichita, on the Missouri Pacific and the Atchison, Topeka, and Santa Fe railroads (Map: Kansas, E 6). It has a Carnegie library, two hospitals, three parks, a city auditorium, and a fine high-school building, and is the seat of Bethel College (Mennonite). The city is a division point on the Santa Fe Railroad, with extensive machine shops, and, as the centre of a fine farming and stock-raising section, has considerable trade. There are some manufactures, principally flour, threshing machines, and grain drills. Newton has adopted the commission form of government. The water works are owned and operated by the municipality. Pop., 1900, 6208; 1910, 7862.

NEWTON. A city in Middlesex Co., Mass., adjoining Boston, on the Charles River and on the Boston and Albany Railroad (Map: Massachusetts, E 3). Within the municipal limits are 11 villages, the city occupying an area of about 18 square miles. Newton has a site of great beauty, several hills contributing to its picturesqueness, and it is one of the most important of Boston's handsome suburbs. There are 247 acres of city parks, besides the Metropolitan Park Reservation (119 acres) and the Metropolitan parkways, which extend along the Charles River. The city maintains a public library (87,000 volumes), and is the seat of the Newton Theological Institution (Baptist), opened in 1825, the Lasell Seminary for women, opened in 1851, and the Allen School for boys, opened in 1853. There are many handsome church buildings and a $500,000 technical high school. The Eliot Memorial in honor of the Apostle to the Indians stands near the site of Waban's wigwam, where John Eliot began on Oct. 28, 1646, to preach to the Indians in the town called Nonantum. A large cemetery is in the heart of the city. Though Newton is primarily a residential city, there are some manufacturing interests. The industrial establishments include machine shops, fire-alarm-supply works, silk mills, worsted mills, rubber works, manufactories of paper boxes, curtains, railway signals, cordage, etc. Under a charter, last revised in 1899 and 1902, the government is vested in a mayor, elected for two years, and a board of aldermen, in which each ward is represented by three members—one alderman elected annually by the ward and two aldermen at large elected from the ward on a general ticket, one being chosen each year to serve two years. Some of the administrative officials are elected by the board of aldermen, and some are subject to confirmation by that body upon nomination of the mayor. The school committee is chosen by popular vote for terms of three years. Newton spends annually in maintenance and operation more than $1,600,000, the principal items being: for interest on debt, $196,000; for sinking funds, $50,000; for schools, $390,000; for drains, parks, sewers, and streets, $300,000; for the police department, $103,000; for street lighting, $61,000; for the fire department and wires, $97,000; for the charity department, $38,000; for the health department, $38,000. Newton is one of the wealthiest cities per capita in the United States; the assessed valuation of property, real and personal, in 1914 was about $85,000,000, and the net debt $2,900,000. The water works are owned and operated by the municipality. Pop., 1900, 33,587; 1910, 39,806; 1915 (State census), 42,929. Settled in 1631 and originally a part of Cambridge (Newtowne), Newton was incorporated as a separate town in 1688, being called New Cambridge until 1692. It was chartered as a city in 1873. Consult Smith, *History of Newton, Massachusetts* (Boston, 1880), and Francis Jackson, *History of the Early Settlement of Newton, 1639–1800* (Newton Centre, 1909).

NEWTON. A town and the county seat of Sussex Co., N. J., 61 miles west by north of New York City, on the Delaware, Lackawanna, and Western Railroad (Map: New Jersey, C 1). Newton is known as a summer resort. It has the Newton Collegiate Institute and the Dennis Library (subscription). The surrounding country is largely agricultural, though there is considerable mineral wealth, and the city manufactures shoes, silks, silk embroidery, paper boxes, towels, and roofing slate. The water works are owned by the municipality. Pop., 1900, 4376; 1910, 4467.

NEWTON, Alfred (1829–1907). An English zoölogist, best known as an ornithologist. He was born at Geneva, Switzerland, of British parents, and graduated at Magdalene College, Cambridge, in 1853. As a traveling fellow of the college he visited Lapland, Iceland, the West Indies, North America, Spitzbergen, and other countries between the years 1854–64. He was the first to hold the professorship of zoölogy and comparative anatomy in Cambridge University (1866–1907). He was made vice president of the Royal and the Zoölogical societies, president of the Cambridge Philosophical Society, and received gold medals from the Linnean and Royal societies. His interest in bird life led him to active efforts towards bird protection, and the first bird-protective measures taken by Parliament were due to his efforts. As these were the first legislative actions taken by any government, Newton may be regarded as the father of bird protection. His publications include: *The Zoölogy of Ancient Europe* (1862); *The Ornithology of Iceland* (1863); *Zoölogy* (1874; 2d ed., 1894); *The Birds of Greenland* (1875); *A Dictionary of Birds* (1893–96), with H. Gadow. He edited the *Ibis* for five years (1865–70). He was active in founding the *Zoölogical Record*, and edited volumes vii to ix (1871–74).

NEWTON, Charles Thomas (1816–94). An English archæologist, born at Bredwardine in Herefordshire. He was educated at Shrewsbury School and at Christ Church, Oxford. In 1840 he became assistant keeper of the department of antiquities in the British Museum, and in 1852 obtained appointment as vice consul at Mytilene, whence he was transferred in 1853 to Rhodes. His position was avowedly in the interest of the British Museum, and his time was largely devoted to archæological travels and excavation. In 1856 he began his great work at Budrun, the ancient Halicarnassus, where he discovered the site of the famous Mausoleum (q.v.) and recovered many remains of the ancient sculptures.

He next worked at Branchidæ (q.v.) and Cnidus, securing valuable results. He was rewarded by an appointment to the consulship at Rome in 1860, and in 1861 was made keeper of Greek and Roman antiquities in the British Museum, a position which he held until failing health led to his resignation in 1885. He acquired for the Museum the important Blacas and Castellani collections of gems and sculptures. From 1880 to 1888 he was Yates professor of classical archæology at the University College, London. In 1861 he married Ann Mary, daughter of the artist Joseph Severn, and herself an artist of high reputation. She died in 1869. Newton published many short papers and discussions, some of which were collected in his *Essays on Art and Archæology* (London, 1880), including the best popular account of Greek inscriptions. Other important works were *History of Discoveries at Halicarnassus, Cnidus, and Branchidæ* (London, 1862–63) and *Travels and Discoveries in the Levant* (ib., 1865). He edited also, after 1885, many of the Greek inscriptions in the British Museum. Consult J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

NEWTON, Gilbert Stuart (1794–1835). An English portrait and genre painter. He was born at Halifax, Nova Scotia, Sept. 20, 1794, the son of Edward Newton, British collector of customs. Newton's parents had quitted Boston after the evacuation by British troops in 1776, but his mother returned to that city upon the death of his father in 1803. He studied painting with his uncle, Gilbert Stuart (q.v.). In 1817 he traveled in Italy and studied at Florence, later visiting Paris (where he was influenced by Watteau) and the Netherlands (where he made a deep study of Dutch painters of the seventeenth century). He entered the schools of the Royal Academy and in 1832 was made Academician. His subjects are chiefly drawn from well-known novels and poems. Among his chief works are: "Deserted" (1821), Metropolitan Museum, New York; "The Lovers' Quarrel" (1826); "The Dull Lecture" (1825), Lenox Library, New York; "Don Quixote in his Study" (1828); "The Lute Player," New York Historical Society; "Yorick and the Grisette" (1830) and "The Window" (1829), both in the Tate Gallery, London; "Portia and Bassanio" (1831), South Kensington Museum; and his last picture, "Abelard," exhibited at the Royal Academy in 1833. Among his portraits are those of Thomas Moore, Sir Walter Scott, and Washington Irving. Newton's pictures, although deficient in drawing, are artistic in color, realistic, and individual in conception. Suffering from mental derangement, in 1833 he was removed to an asylum at Chelsea, where he died of consumption, Aug. 5, 1835.

NEWTON, Hubert Anson (1830–96). An American astronomer and mathematician, noted for his researches on meteors. He was born at Sherburne, N. Y., and graduated at Yale in 1850. In 1855 he was appointed professor of mathematics at Yale. His chief labor, the study of the laws of meteors and of comets and their interrelation, began with the attempt to contribute to the theory advanced by Professor Olmsted of Yale in 1833 that meteors were a part of a mass of bodies moving round the sun in a fixed orbit. Newton calculated five possible orbits, and showed the mode of deciding between them, by a computation of the secular motion of the node. He supervised the work of the Connecticut Academy of Arts and Sciences in 1861 in regard to the August and November meteors, prepared a map of the heavens for its use, and identified comets with meteors and shooting stars. This led to his valuable statistical study of comets. On these subjects he became a world-wide authority, winning from the National Academy of Sciences the Smith gold medal for his researches on meteors. He was elected an associate of the Royal Astronomical Society of London (1872), president of the American Association for the Advancement of Science (1885), and foreign member of the Royal Society of Edinburgh (1886). Many of his papers on meteors were published in the *Memoirs of the National Academy*, the *Journal of Science*, and the *American Journal of Science*.

NEWTON, Sir Isaac (1642–1727). A famous English mathematician and natural philosopher, born at Woolsthorpe in Lincolnshire, Dec. 25, 1642 (O. S.). Newton received his early education at the grammar school of Grantham, in the neighborhood of his home, at Woolsthorpe. On June 5, 1661, he left home for Cambridge, where he was admitted as subsizar at Trinity College. On July 8 following he matriculated as sizar of the same college. He immediately applied himself to mathematical studies and within a very few years not only made himself master of most of the works of value then existing, but had also begun to make some progress in original methods for extending the science. In the years 1665 and 1666 he made many important mathematical inventions and discoveries, including that of the binomial theorem, the method of tangents, the direct method of fluxions (integral calculus), and the action of gravity on the moon. According to a legend, which, however, is seriously considered by certain authorities, in the year 1665 the fall of an apple, as Newton sat in his garden at Woolsthorpe, suggested the most magnificent of his subsequent discoveries—the law of universal gravitation (q.v.). On his first attempt, however, to apply the law, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth which, based on the value of a degree of latitude then prevalent, was so erroneous as to produce a discrepancy between the value of the real force of gravity and that required by theory to explain the motions and indicated only an approximate verification of his theory. Further, he was unable at this time to show mathematically that a homogeneous attracting sphere behaved as if all the matter were concentrated at its centre. He accordingly abandoned for a number of years the hypothesis for other studies, which consisted chiefly of investigations of the nature of light and the construction of telescopes (q.v.). In 1666 he had acquired a prism and in 1668 completed his first reflecting telescope, with which he observed Jupiter's satellites. In a variety of ingenious and interesting experiments where a spectrum was produced by sunlight refracted through a prism in a darkened room, he was led to the conclusion that rays of light which differ in color differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope, which had not till then been accounted for. The indistinctness of the image formed by the object glass was not necessarily due to any imperfection of its form, but to the fact of the different colored rays of light being

SIR ISAAC NEWTON

FROM AN ENGRAVING BY ROBERT C. BELL, AFTER A PAINTING BY SIR GODFREY KNELLER

brought to a focus at different distances. He concluded rightly that it was impossible for an object glass consisting of a single lens to produce a distinct image. He went further, and too hastily concluding, from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the invention of the achromatic telescope by Chester More Hall about 1729 and afterward, independently, by Dollond (q.v.) in 1758—turned Newton's attention to the construction of reflecting telescopes, and the form devised by him is the one which, at later periods, has proved so useful in astronomical researches.

It was on Jan. 11, 1672, that Newton was elected a member of the Royal Society, having become known to that body from his reflecting telescopes, and a month later his famous paper on a "New Theory about Light and Color" was read before that body, in which he states that "Light consists of rays differently refrangible" and that "Colors are not qualifications of light derived from refractions or natural bodies, as is generally believed, but original and connate properties which in divers rays are divers." He also said that "White light is ever compounded and to its composition are requisite all the aforesaid primary colors mixed in proper proportion." In 1675 Newton communicated to the Royal Society a paper on light and color, which contained an explanation of the production of colors by thin plates or films and in which were given the results of the first measurements of the colored rings now known as Newton's rings (q.v.). Newton formulated the emission theory of light from hypotheses previously advanced by Descartes, and a complete exposition of that theory was the result. All of Newton's investigations in light and color were collected into a work with the title of *Opticks*, published in 1704. The development of the theory was accomplished by rigid dynamical reasoning, and the explanations of reflection, refraction, diffraction, and the colors of thin plates were made on the basis that light was due to corpuscles sent out from the light-giving body. This theory, while it did not survive the work of Young and Fresnel, nevertheless had more points in common with the undulatory theory than is generally supposed (*Opticks*, book ii, part iii, prop. XII). At what period Newton resumed his calculations about gravitation does not clearly appear, but it was in the year 1684 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations, Halley undertaking to print it at his own expense. The principal results of his discoveries were set down in a treatise called *De Motu Corporum* and were afterward more completely unfolded in the great work entitled *Philosophiæ Naturalis Principia Mathematica*, which was finally published about midsummer 1687. In the *Principia* Newton formally introduced the ideas of mass and force and established the science of theoretical mechanics, as it exists to-day. In the entire history of science no single contribution of any man has been as important as this.

Shortly before the *Principia* was given to the public Newton, who since 1669 had occupied the Lucasian chair at Cambridge, was called to take an active part in defending the rights of the university against the illegal encroachments of James II. The conspicuous part which he had taken on that occasion procured him a seat in the Convention Parliament, in which he sat from January, 1689, to its dissolution in 1690. In 1696 he was appointed Warden of the Mint and in 1699 was promoted to the office of Master of the Mint, an office which he held till the end of his life. He again took seat in Parliament in the year 1701 as the representative of his university. In the interval of public duty, however, Newton showed that he still retained the scientific power by which his great discoveries had been made. He was president of the Royal Society from 1703 till his death, a period of 24 years, being each year reëlected. In this position and enjoying the confidence of Prince George of Denmark, he did much towards the advancement of science, and one of his most important works during this time was the superintendence of the publication of Flamsteed's *Greenwich Observations*. The controversy between Newton and Leibnitz as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. Newton died on March 20, 1727 (O. S.), and his remains were interred in Westminster Abbey, where a monument was erected to his memory in 1731. A magnificent full-length statue of the philosopher, executed by Roubilliac, was erected in 1755 in the antechapel of Trinity College, Cambridge. This work was assisted by a cast of the face taken after death, which is preserved in the University Library at Cambridge. In 1699 Newton was elected a foreign associate of the Academy of Sciences, and in 1705 he received the honor of knighthood from Queen Anne. Among the best editions of Newton's principal works are the quarto edition of the *Opticks* (London, 1704) and the quarto edition of the *Principia*, published at Cambridge, England, in 1713.

Bibliography. D. Brewster, *Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton* (2d ed., London, 1860); W. W. R. Ball, *History of Mathematics* (ib., 1893); id., *Essay on Newton's Principia* (ib., 1893); G. J. Gray, *Bibliography of the Works of Sir Isaac Newton* (Cambridge, 1907); Augustus De Morgan, *Essays on the Life and Work of Newton* (Chicago, 1914), containing a bibliography.

NEWTON, John (1622–78). An English mathematician and astronomer, born at Oundle, Northamptonshire. He studied at Oxford and remained loyal to the King under Cromwell. Newton was something of an educational reformer, urged intelligent instruction in mathematics, and wrote textbooks on arithmetic, geometry, astronomy, logic, and rhetoric. But his most important labors were for the better understanding and wider use of the decimal system and of logarithms. His *Institutio Mathematica*, with its logarithmic tables and descriptions of applications to astronomy, dialing, and navigation (1654), is one of the earliest books of its kind in English. Other works are: *Astronomia Britannica: Help to Calculation* (1657); *Trigonometria Britannica* (1658); *A*

Perpetual Diary or Almanac (1662); *School Pastime for Young Children* (1669).

NEWTON, John (1725–1807). A Church of England divine. He was born in London, July 24, 1725, and from 11 to 17 was at sea with his father (captain of a vessel). He became midshipman on a man-of-war, but deserted; and after a variety of experiences, including four years in the African slave trade, he abandoned a seafaring life, and from 1755 to 1760 was tide surveyor at Liverpool. At this time he studied Greek, Hebrew, and theology, having been suddenly converted to Christianity, and in 1764 was ordained and appointed curate of Olney, Buckinghamshire, where he remained 16 years. He entered heartily into the religious work and views of Wesley and Whitefield. At Olney he published in 1764 *An Authentic Narrative of Some Remarkable and Interesting Particulars in the Life of the Rev. John Newton.* Here, too, he formed an intimate friendship with William Cowper (q.v.) and in connection with him produced the *Olney Hymns* (1779), some of which have since been in constant use. In 1780 he became rector of St. Mary Woolnoth, London, where he remained till his death, Dec. 31, 1807. His works, besides those already mentioned, were a *Review of Ecclesiastical History* (1770); *Omicron's Letters* (1774); *Cardiphonia, or the Utterances of the Heart* (1781); *Messiah: Fifty Discourses on the Scriptural Passages of the Oratorio of Handel* (1786); etc. His collected works were edited with memoir by Cecil (London, 1808).

NEWTON, John (1823–95). An American military and civil engineer and soldier. He was born in Virginia and was educated at West Point, receiving a commission in the Corps of Engineers on his graduation in 1842. After serving as assistant professor of engineering at the United States Military Academy for three years, he was occupied with the construction of fortifications and river and harbor improvement on the Atlantic coast. During the Civil War, after receiving the rank of brigadier general of volunteers, he was summoned to assist in constructing the defenses of Washington. He took part in the battles of Gaines's Mill, Glendale, South Mountain, and Antietam, and in command of a division he was present at Fredericksburg, at Salem, and at Gettysburg. In the invasion of Georgia he led a division of the Army of the Cumberland through all the engagements preceding the capture of Atlanta, and March 13, 1865, he was made brevet major general in the United States army. After the war he was occupied in strengthening the defenses of New York harbor, in removing the obstacles to navigation at Hell Gate (q.v.) and other portions of the East River, in harbor improvements at Lake Champlain and in New York harbor. On June 30, 1879, he attained the rank of colonel in the Corps of Engineers; in 1884 was made brigadier general and chief of engineers; retired in 1886. He was commissioner of public works, New York City, 1887–88, a position which he resigned to become president of the Panama Railroad Company in 1888.

NEWTON, Richard Heber (1840–1914). An American Protestant Episcopal clergyman, born in Philadelphia. He studied at the University of Pennsylvania (A.B., 1862) and at the Episcopal Divinity School, Philadelphia, and was ordained priest in 1866. From 1869 to 1902 he was rector of All Souls' Church in New York City, and from 1903 till his death chaplain at Leland Stanford Junior University. An adherent of the more radical party in his church, he became noted for the freedom with which he expressed his views from the pulpit and in writings. He published: *Studies of Jesus* (1881); *Right and Wrong Uses of the Bible* (1883); *The Book of the Beginnings* (1884); *Philistinism* (1885); *Social Studies* (1887); *Church and Creed* (1891); *Christian Science* (1898); *Parsifal* (1904); *The Mysticism of Music* (1915).

NEWTON, Robert Safford (1818–81). An American physician, born at Gallipolis, Ohio. He received the degree of M.D. from the University of Kentucky in 1841. Having practiced for four years in his native town, he removed to Cincinnati in 1845, became professor of surgery at the University of Memphis (Tenn.) in 1849, and two years later accepted a chair in the Eclectic Medical Institute, Cincinnati. He resigned in 1862 and settled in New York City. There he helped to found (1865) the Eclectic Medical College, in which he served as professor of surgery from 1865 until his death and of which he was president in 1875–81. Newton was the inventor of several surgical instruments and a successful operator. He was editor of the *Eclectic Medical Journal* (1851–61), of the *Eclectic Medical Review* (1866–72), and of the *Medical Eclectic* (1873–81), and published: *An Eclectic Treatise on the Practice of Medicine* (1861); *An Eclectic Treatise on Diseases of Children* (1867), with W. B. Powell; *A Treatise on Antiseptic Surgery* (1876); *Explorations in Cell Pathology* (1877).

NEWTON AB′BOT. A market town and urban district in Devonshire, England, on the Teign estuary at the mouth of the Lemon, 15 miles south of Exeter (Map: England, C 6). It has railway works, a shipping trade, and considerable commerce in agricultural produce and cattle. Its principal industry is the manufacture of ornamental pottery from china clay and potter's clay, found in the neighborhood. Lignite and tin ore are mined. There are also breweries, tanneries, and foundries, and an annual cattle market. It has some interesting old buildings, a town hall, and municipal markets. In the vicinity are important remains of a Roman encampment. Charles I lodged at Newton Abbot during his western campaign, and here William III was first proclaimed King in 1688. Pop., 1901, 12,517; 1911, 13,711.

NEWTON-IN-MAKERFIELD, mā′kẽr-fēld, *colloq.* măk′ẽr-, or Newton-le-Willows. A manufacturing town and urban district in Lancashire, England, 15 miles west of Manchester. The chief industries are the manufacture of sugar, paper, railway wagons, printing, iron, and glass; there is also coal mining. The town has a town hall, mechanics' institute, a grammar school, and a reform school. The beautiful lake called Newton Mere is much frequented in summer. Horse races are held here in June, and horse and cattle fairs in May and August annually. The barony belonged to Edward the Confessor. Pop., 1901, 16,699; 1911, 18,451.

NEWTON'S RINGS. The colored rings seen when a thin film of air or other substance intervenes between the surfaces of two plates of glass. This phenomenon is named from its discoverer, Sir Isaac Newton, who in his work on *Opticks* describes how he took a plano-convex lens designed for a 14-foot telescope and placed it with its plane side downward on top of a double convex lens constructed for a telescope of about 50 feet in length. On slowly pressing the upper lens against the lower, a number of concentric rings having the point of contact of the lenses as their centre appeared, increasing in size as the pressure was increased. This arrangement of a lens and plane surface is often employed in performing the experiment, and the thickness of the film and the wave lengths of the different kinds of lights can be ascertained. The effect is due to the interference (q.v.) of the waves of light reflected from the upper and lower surfaces of the thin film of air, which from nothing at the point of contact gradually increases in thickness with the distance from the centre. If light of one color, or, speaking more scientifically, of a single wave length, is used, the rings will be alternately bright and dark, the bright waves being produced by the combination of the various waves caused by interference and overlapping. Therefore the colors of Newton's rings are not pure spectral colors, though they are extremely brilliant and varied. In the centre, where the glass surfaces are in contact, there is a dark spot, and as the air film begins to have an appreciable thickness the rings are formed. See LIGHT, section *Interference and Diffraction.* Consult: Thomas Preston, *Theory of Light* (London, 1901); S. P. Thompson, *Light, Visible and Invisible* (2d ed., New York, 1910).

NEWTON THEOLOG'ICAL INSTITU'TION. A divinity school at Newton Centre, Mass., founded in 1825, under the supervision of the Baptist churches of New England, but open to members of any Christian denomination. It has a three years' course leading to the degree of bachelor of divinity. In 1915 there were 8 instructors and 70 students. The buildings, 8 in number, are valued with the grounds at $400,000. The institution has a library of 34,000 volumes, an endowment of $800,000, and property estimated at $1,300,000. The president in 1915 was George E. Horr, D.D.

NEW'TOWN. A town in Fairfield Co., Conn., 20 miles north of Bridgeport, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, B 4). It contains the Beach Memorial Library and has many beautiful drives. It is situated in a rich agricultural region, and farming is the chief industry. There is a fire-hose factory. The water works are owned by the town. Pop., 1900, 3276; 1910, 3012.

NEWTOWN, BATTLE OF. See ELMIRA, NEW YORK.

NEWTOWNARDS, nū'ton-ärdz'. A town in County Down, Ireland, 9 miles east of Belfast, on Lough Strangford (Map: Ireland, F 2). It has many interesting ruins, notably those of the thirteenth-century parish church, containing many monuments. For 100 years the manufacture of linen goods has been the most important industry. Newtownards was chartered as a borough by James I. Pop., 1901, 9110; 1911, 9587.

NEW ULM. A city and the county seat of Brown Co., Minn., 88 miles southwest of St. Paul, on the Minnesota River and on the Chicago and Northwestern and the Minneapolis and St. Louis railroads (Map: Minnesota, C 6). The city has a handsome courthouse, St. Alexander and Union hospitals, and public school and Turnverein libraries, St. Michael's Academy, and Dr. Martin Luther College (Lutheran). New Ulm is the centre of a rich agricultural and stock-raising region and carries on considerable trade. Its industrial establishments comprise grain elevators and flour mills, breweries, cigar factories, marble works, greenhouses, a nursery, brick plants, machine shops, cooperage shops, and manufactories of pipe organs, woolens, pottery, electrical appliances, overalls, shirts, and creamery products. Under a revised charter of 1891 the government is vested in a mayor, elected biennially, and a council. There are municipal water works and electric-light plants. Settled in 1854, New Ulm was incorporated in 1876. It was in 1862 the scene of an Indian massacre. A memorial has been erected to the citizen soldiers killed by the Indians, and on Hermann Heights is a fine monument in honor of Hermann (Arminius). Pop., 1900, 5403; 1910, 5648.

NEW WAY TO PAY OLD DEBTS, A. A play by Massinger, printed in 1632. It was written probably in 1625. Fletcher has been credited with a share in it, but his part, if any, was slight. It was the most popular of Massinger's plays and was acted until recent times.

NEW WEST'MINSTER. The former capital and one of the chief cities of British Columbia, Canada, on the Fraser River, 15 miles above its mouth, about 60 miles north-northeast (direct) of Victoria, and on the Canadian Pacific, the Great Northern, and the Canadian Northern railways (Map: British Columbia, D 5). It is the capital of the New Westminster electoral district. The river at this point is about a mile wide and contains several inhabited islands. The harbor is excellent and is under the control of a commission similar to the Montreal harbor commission. The city is the centre of considerable tracts of arable land, is delightfully located, has a fine climate and a heavy rainfall. It possesses Anglican and Roman Catholic cathedrals, a Roman Catholic orphanage and seminary, an armory, two hospitals, Columbian College, the municipal buildings, a public library, and several parks. The leading industries are lumbering and salmon canning. The lumber mills are among the largest in the world, and about 40 salmon canneries are in the vicinity. There are also manufactories of wire and nails, gasoline engines, cigars, foundry and machine-shop products, boats, boilers, sashes and doors, electric cars, beer, whisky, wood pipes, etc. The city owns its electric-lighting system, street railway, and water works. Pop., 1901, 6499; 1911, 13,999; 1915 (local est.), 20,500.

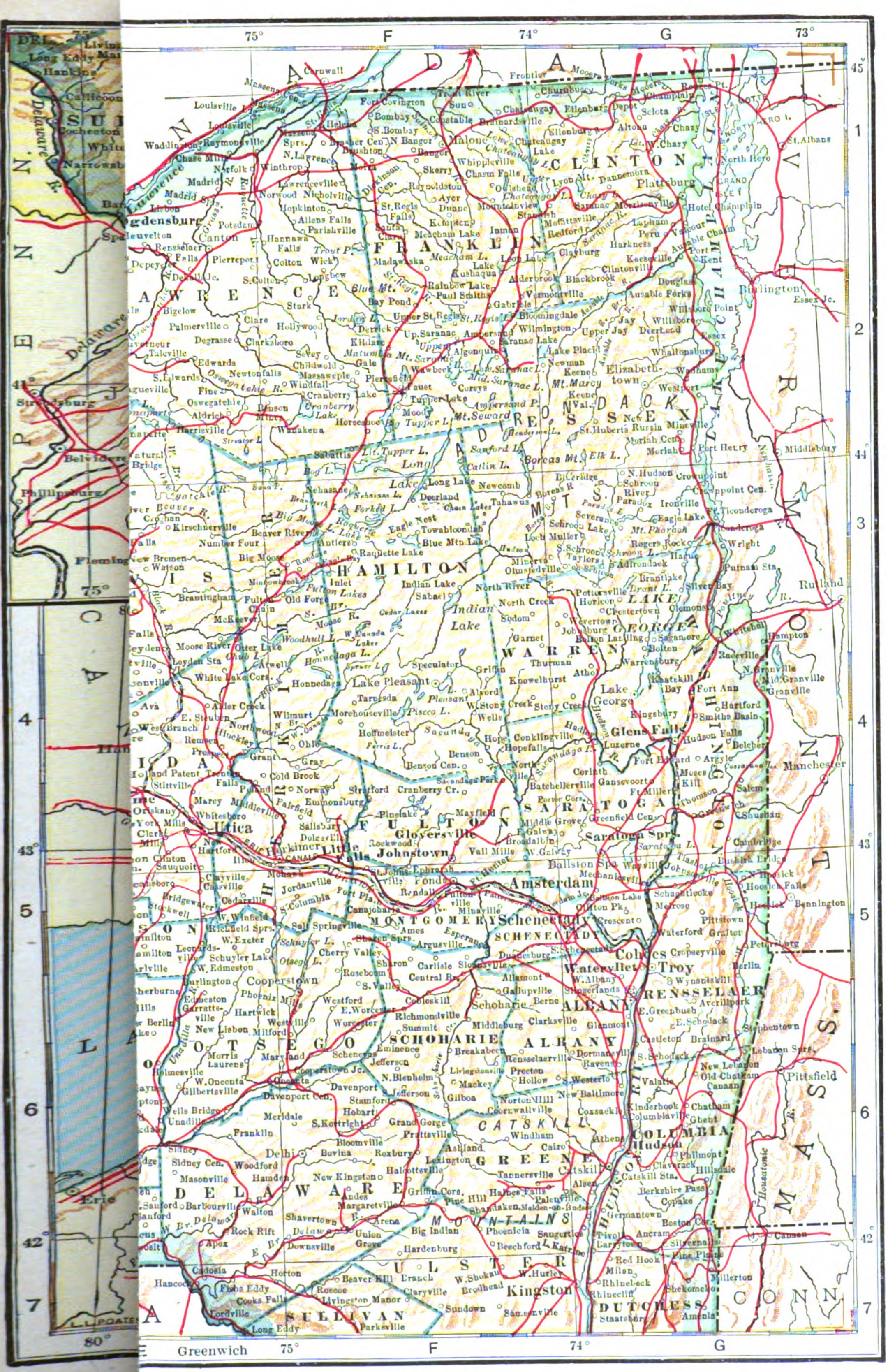
NEW YEAR RIVER. See BOGAN.

NEW YEAR'S DAY. The first day of the year. The custom of celebrating the first day of the year by some religious observance, generally accompanied by festive rejoicing, appears to have prevailed among most of the ancient nations. The Jews, the Egyptians, the Chinese, the Romans, and the Mohammedans, although differing as to the time from which they reckoned the commencement of the year, all regarded it as a day of special interest. In Rome the year anciently began in March; and when Numa, according to the ancient legend, made the year begin on January 1, that day was held sacred to *Janus Bifrons*, who was thus supposed to turn at once back upon the old year and forward into the new. On the establishment of Christianity the usage of a solemn inauguration of the new year was retained; but considerable differences prevailed both as to the time and the manner of its celebration. Christmas Day, the Annunciation (March 25), Easter Day, and March 1st, have all, at different times or places, shared with January 1 the honor of opening the new year; nor was it till late in the sixteenth century that January 1 was in most countries accepted as the first day of the year. Countries using the Julian calendar, in which the year begins 13 days later than in the Gregorian, celebrate New Year's Day—and indeed all other fixed holidays—13 days after the rest of the world. Thus Russia, Greece, and a few other countries celebrate New Year's on January 13. The early fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebration, and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. This mandate, however, was but partially observed.

The social observances of the first day of the year appear to have been essentially the same in all ages. From the earliest recorded celebration we find notice of feasting and the interchange of presents. Tradition referred the origin of New Year's gifts among the Romans to Tatius, King of the Sabines (747 B.C.). Branches cut from the wood consecrated to Strenia, the goddess of strength, were received by him on the first day of the year as tokens of good omen. He sanctioned the custom and called the gifts *strenæ* (cf. French *jour d'étrennes*). In later times in Rome similar practices attended the worship of Salus. Simple *strenæ*, consisting of branches of bay and of palm, sweetmeats made of honey, figs, or dates—as a good omen that the year might bring only joy and happiness (Ovid, *Fasti*, i, 185–190)—finally gave way to gifts of more elaborate character. The custom of presenting gifts to the Emperor became so general that the people went en masse to carry him presents and to wish him a happy new year. The writers of the Empire describe other observances—such as exchanging visits, masquerading, and feasting—which characterized the day. The festival held by the Druids at the opening of the year resembled the worship of Salus by the Romans. The priests cut the sacred plant and distributed the sprays. In many countries the night before New Year's (St. Sylvester's Eve) was celebrated with great festivity, which was prolonged till after midnight, when the new year was ushered in with congratulations, visits, and mutual wishes. This is an ancient Scottish custom, which prevails also in many parts of Germany, where the form of wish—"Prosst- (for the Lat. *prosit*) Neujahr" (May the new year be happy)—attests the antiquity of the custom. In many places the practice of tolling bells at midnight, and thus "ringing in the new year," is still observed. Many religious communions are wont to celebrate it with a special service or watch night. In the Roman Catholic church the *Te Deum* is often sung at the close of the old year in thanksgiving for the blessings granted during its course, and New Year's Day is a holy day of obligation, because on it falls the Feast of the Circumcision.

NEW YORK (popularly called the Empire State). A Middle Atlantic State of the United States. It lies between lat. 40° 30′ and 45° 1′ N. and long. 71° 51′ and 79° 46′ W. and is bounded on the northwest by Lake Ontario and the St. Lawrence River, which separate it from the Canadian Province of Ontario, on the north by the Province of Quebec, and on the east by the States of Vermont, Massachusetts, and Connecticut, a part of the Vermont boundary being formed by Lake Champlain. On the south the Atlantic Ocean and its arms, Long Island Sound, New York Bay, and Staten Island Sound, surround Long Island and Staten Island, while the mainland portion is bordered by the States of New Jersey and Pennsylvania. On the west the boundary is completed by the latter State, together with Lake Erie and the Niagara River. New York extends 312 miles from north to south and 326 miles from east to west. It ranks twenty-sixth in size among the States, its area being 49,204 square miles, of which 47,654 are land.

Topography. New York may be divided into several fairly distinct provinces. The first includes Long Island and Staten Island. Their rock materials are mostly of Cretaceous, Pleistocene, and recent deposition, and the reliefs are small, the chief elevations being a belt of morainic hills running through the axis of Long Island from Montauk Point to The Narrows. Conspicuous barrier beaches, spits, and lagoons have been formed on the ocean side. The second province may be called the eastern mountain belt, not embracing any part of the Adirondacks. It includes the Hudson valley and mountain-built sections of various ages. Among these we enumerate the Highlands of the Hudson, a plateau traversed by the gorge of the river from Fishkill to Peekskill; the foothills and worn extensions of the Green Mountains and of the Berkshires, east of the Hudson and reaching the south end of Manhattan Island; also the northern extension of the Appalachian ridges of Pennsylvania, to be seen northeasterly from Port Jervis, in the Shawangunk Range, and in the Little Catskills, a series of low ridges with typical mountain structure, lying between the Hudson River and the Catskill Mountains. The next is the plateau province, including the so-called Catskill Mountains on the east and the uplands of central and southern New York westward to Lake Erie. The altitudes are from 2500 to 4000 feet in the Catskills and from 1600 to 2500 feet elsewhere, except in the Finger Lake region, where at the north the altitudes are much less. The plateau is dissected by many valleys belonging to the Delaware, Susquehanna, Allegheny, and St. Lawrence drainage. The province as a whole belongs to the Appalachian plateau, which continues through western Pennsylvania to central Tennessee and Alabama. The lake plains extend narrowly along Lake Erie and broadly along Lake Ontario and the upper St. Lawrence. They were covered by glacial extensions of the Great Lakes, are marked in the Ontario region by hundreds of glacial drumlins, and are divided into a higher and a lower section in the west by the Niagara escarpment. The Adirondack province occupies the greater part of the State north of the Mohawk and consists of very ancient mountains, rejuvenated by later uplifts and now forming a series of northeast-southwest ranges from 2000 to more than 5000 feet in height. Mount Marcy, having an altitude of 5344 feet, is the highest point in the State.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FULTON
MONTGOMERY
SCHENECTADY
ALBANY
RENSSELAER
SCHOHARIE
OTSEGO
DELAWARE
GREENE
COLUMBIA
ULSTER
DUTCHESS
SULLIVAN
ONEIDA
ADIRONDACK MTS.
CATSKILL MOUNTAINS
LAKE GEORGE
Plattsburg
Malone
Ogdensburg
Canton
Potsdam
Massena
Saranac Lake
Lake Placid
Mt. Marcy
Mt. Seward
Ticonderoga
Glens Falls
Saratoga Sprs.
Utica
Little Falls
Gloversville
Johnstown
Amsterdam
Schenectady
Cohoes
Troy
Watervliet
ALBANY
Cooperstown
Oneonta
Catskill
Hudson
Kingston
Burlington
Rutland
Bennington
Pittsfield
Delaware R.
Hudson R.
Mohawk R.
Erie Canal
Stroudsburg
Belvidere
Phillipsburg
Lake Ontario
Erie

Some physiographers distinguish a Mohawk valley province and a Tug Hill province, the latter being a small plateau north of Oneida Lake, having the Ontario plain on the west and being separated by the Black River valley from the Adirondack region on the east.

Hydrography. The rivers of the State belong to five main drainage basins: the St. Lawrence, Hudson, Mississippi, Susquehanna, and Delaware. The St. Lawrence basin covers the largest area, but includes mostly small streams flowing into Lakes Erie and Ontario, the St. Lawrence River, and Lake Champlain. The largest of these streams are the Genesee, the Oswego, and the Black rivers, all emptying into Lake Ontario. The second drainage basin is that of the Hudson, the only large river flowing entirely within the State. It explains in large part the commercial supremacy of New York, for the Hudson-Mohawk valley affords a favorable canal and railway route leading into the heart of the continent. Even before the Erie Canal was constructed the Hudson and Mohawk valleys constituted an important trade route between the Atlantic and the Great Lakes. The Delaware and Susquehanna rivers both rise in this State, draining its south-central portion. The latter is a large river before it crosses the boundary, but is not navigable. The Mississippi system is represented only by the Allegheny River in the extreme western part. Many of the rivers occupy mature, preglacial valleys throughout a greater part of their course, but pass at some points through steep-walled gorges and are broken by falls and rapids. These immature features are explained by glacial blockade and diversion of the streams from their ancient channels. Examples are the Niagara, the Genesee at Portage and Rochester, the West Canola Creek at Trenton Falls, and the Mohawk from Schenectady to the Hudson.

New York is dotted with numerous lakes celebrated for beauty. Some of them are of considerable size, and many are of an elongated type, formed by the damming of river valleys by glacial materials. This type appears most conspicuously in the group known as the Finger Lakes in the western part of the State. They lie nearly parallel in a north and south direction. The largest are Lakes Seneca and Cayuga, each nearly 40 miles long and from 2 to 3 miles wide. Lake Chautauqua in the extreme west and the picturesque Lake George in the extreme east are of similar formation, as is also Oneida Lake in the central portion, the last having a width of over 5 miles, with a length of 20 miles. The Adirondack region abounds in mountain lakes of romantic beauty.

Climate. The climate is of the continental rather than the oceanic type, though the extreme coastal regions of Long Island are somewhat tempered by the ocean. The range of temperature is nowhere as great as in the States of the northwestern plains. The summer maximum is from 90° F. to 100° F., varying in different parts. The minimum is about zero on the sea border and ranges from —20° F. to —30° F. in most parts of the interior, while in the Adirondacks records of —40° F. are not uncommon. The rainfall varies from 50 or 60 inches in the southeast to averages of about 35 inches in the lake region of western New York.

Geology. There are two areas of Archean rocks, which represent the portions of the State that rose above the pre-Cambrian ocean. These are the Adirondack region of the north and the Highlands of the Hudson. Both consist of very ancient crystalline and metamorphic rocks, granites, gneisses, etc., with intruded basic rocks forming the central or Mount Marcy group of the Adirondacks. The northern Archean area is flanked on the north by outcrops of Potsdam sandstone of Cambrian age, and the entire Adirondack area is bordered by a belt of Ordovician limestones, shales, and sandstones which continues southwest along the Hudson and southwestward from the region of Poughkeepsie and Newburgh into New Jersey and Pennsylvania. At the close of the Ordovician period the Taconic uplift created a land connection between the Adirondacks and the Highlands region. Central New York was then occupied by a shallow interior sea in whose borders the Silurian sediments were laid down. These now extend along the south shore of Lake Ontario and through central to eastern New York, where they lie unconformably upon the Ordovician formations. The depositions of the Devonian period followed. They were also laid down in shallow waters and are now represented by several thousand feet of sandstones, shales, and conglomerates, extending from the Catskill region to Lake Erie and constituting the basis of the plateau region.

Deposits of Carboniferous age, overlying the Devonian, are of small extent and are confined to the border in the southwest. The Mesozoic era is represented by a small triangular area of Triassic sandstones in the vicinity of Haverstraw, extending, with the included Palisades lava sheet, southward into New Jersey. Limited areas of Cretaceous beds are found in Long Island and Staten Island. Glacial action has been effective in shaping the present topography of New York, by the formation of lakes, the changing of river courses, the scooping out of some valleys and filling in of others, and the deposition of morainic materials, these materials covering the older rock formations in an irregular sheet from a few inches to several hundred feet in thickness. The glacial deposits form the basis of the soils, with the exception of a small area in southwest New York which lay outside of the ice sheet. Even the alluvium of the river valleys and the deposits made on the more exposed floors of parts of the glacial Great Lakes are of reworked glacial materials.

Mineral Resources. The coal measures, which are so extensively developed south of the boundary, are not represented in this State. There are valuable clay beds in the river valleys and in the lowlands around the lakes, formed by the deposits from the larger lakes which covered those regions in Pleistocene times. The granites of the Archean regions, the limestones of the Trenton and Niagara formations in the northwest, and the Potsdam and Catskill sandstones, especially those layers of the Hamilton group known as the Hudson River bluestone, form valuable sources of building stone. The principal metallic ore is iron, which occurs in extensive beds of magnetite and hematite in the crystalline rocks of the Adirondacks and in the Clinton formations of central and western New York. Interbedded with the shales of the Silurian strata south of Lake Ontario are extensive deposits of rock salt from 15 to 150 feet thick. Deposits of gypsum occur in the same region. Roofing slate is quarried in eastern

New York. White petroleum and natural gas are obtained in the southwestern section of the State and talc and graphite in the Adirondack region. Sand and gravel are found in great quantities, and peat occurs in low lands.

New York in 1913 ranked second in the variety of mineral substances produced and fifteenth in the value of its total mineral output. Clay products, of which there are a great variety, form the chief item contributed to the mineral production, amounting in 1913 to about 30 per cent of the total value of the mineral output. The most important clay product is common brick, manufactured principally in the Hudson River region, embracing the counties of Albany, Columbia, Dutchess, Greene, Orange, Rensselaer, Rockland, Ulster, and Westchester, which is probably the largest brick-producing region in the world. Next to common brick are porcelain electrical supplies and architectural terra cotta. The total value of the clay products was, in 1913, $11,469,476. Next in value are the quarry products. Limestone, used chiefly for road making, railroad ballast, concrete, and flux, is the principal stone produced. New York ranked third in 1913 among the States in the value of output of its quarries, which amounted to $7,185,493. Third in point of value is the production of cement, and in 1913 there were produced 5,208,120 barrels, valued at $4,918,119. Natural cement, produced in the vicinity of Rosendale, was formerly an important product. The larger portion of this variety produced in the United States came from this district, but Portland cement or more uniform product has supplanted it almost entirely. In the mining of gypsum New York ranks first. The quantity of this mineral mined in 1913 was 529,627 short tons, valued at $1,280,699. New York ranks second in the production of salt, about half of which is obtained from evaporation of brine. The production in 1913 was 1,509,272 short tons, valued at $2,865,187. New York stands practically alone in the production of fibrous talc. It is produced almost exclusively at Gouverneur in St. Lawrence County, and in 1913 the output amounted to 81,705 tons, valued at $788,500. The production of iron ore, more than 90 per cent of which comes from the vicinity of Fort Henry on Lake Champlain, was 1,420,889 long tons, valued at $3,100,235. The output of sand and gravel was 8,624,093 short tons, valued at $2,963,663. The natural gas produced in the same year was valued at $2,425,633. The production of petroleum amounted to 902,211 barrels, valued at $2,169,357. New York ranks first in the production of gypsum, whose output was valued at $1,280,669, and it also leads in the production of aluminium, emery, abrasive garnet, graphite, and millstones. It is second in the production of feldspar and iron pyrite and third in the production of infusorial earth. In addition to the substances mentioned above there are produced occasional gems, lead, mica, metallic paints and other natural pigments, quartz, slate, flagstones, zinc, and mineral waters. The total value of the mineral production in 1913 was $41,594,052. (This does not include aluminium or pig iron.) There were also produced in that year 1,967,449 long tons of pig iron, valued at $30,203,673, largely from Lake Superior ores.

Agriculture. In 1910, out of a total of 30,498,560 acres, there were 22,630,367, or 74.3 per cent, in farms. These numbered 215,597, and the average acreage per farm was 102.2. The total value of farm property, including land, buildings, implements, machinery, and live stock of all kinds, in 1910 was $1,451,481,495. Of the total number of farms in 1910, 170,725 were operated by owners and managers and 44,872 by tenants. The native white farmers numbered 187,629, the foreign-born white farmers 27,029 and the negro and other nonwhite farmers 939. Of the foreign-born white farmers in the State, 8551 were born in Germany, 4770 in Ireland, 3710 in England, and 3414 in Canada.

The table below gives the acreage, production, and value of the important crops as estimated for 1914 by the United States Department of Agriculture.

CROPS	Acreage	Prod. in bu.	Value
Corn	550,000	22,550,000	$18,716,000
Wheat	360,000	8,100,000	8,748,000
Oats	1,275,000	40,162,000	20,483,000
Barley	75,000	2,100,000	1,491,000
Rye	129,000	2,283,000	2,032,000
Buckwheat	274,000	6,302,000	4,790,000
Potatoes	367,000	53,215,000	23,415,000
Hay	4,653,000	*5,584,000	81,526,000

* Tons.

For many years New York was the ranking State in the importance of its agriculture and as late as 1890 was surpassed only by Illinois. The total value of crops in 1909 was $209,168,000, and the combined acreage was 8,371,731. The leading crops in the order of importance are hay and forage, potatoes, and oats. Hay and forage represented 37 per cent of the total value of crops in 1909, when, with an acreage of 5,043,873, there were produced 7,055,429 tons, valued at $77,360,645. In that year oats had an acreage of 1,302,508, and the production amounted to 34,795,277 bushels, valued at $17,977,155. Corn had an acreage of 512,442, which yielded 18,115,634 bushels, valued at $11,439,169. Dry edible beans was also an important crop in 1909, to which there were devoted 115,698 acres, producing 1,681,506 bushels, valued at $3,689,064. Buckwheat and rye had acreages of 286,276 and 130,540 respectively. The production of the former was 5,691,745 bushels, valued at $3,587,558, and of the latter 2,010,601 bushels, valued at $1,578,408. The production of barley was 1,922,868 bushels, valued at $1,316,117, the acreage planted being 79,956. Potatoes, in the production of which New York ranked first in 1909, had an acreage of 394,319, and there were produced 48,597,701 bushels, valued at $20,338,766. The hops grown on 12,023 acres amounted to 8,667,138 pounds, valued at $2,597,981. Excluding potatoes, sweet potatoes, and yams, the acreage of vegetables was 175,402 and their value $15,963,000. The production of orchard fruits was 29,456,291 bushels, valued at $17,988,894. Of this, apples comprised 25,409,324 bushels, valued at $13,343,028. The most important orchard fruits other than apples are peaches and pears. There were grown, in 1909, 253,006,361 pounds of grapes, valued at $3,961,677. Of small fruits there were grown 37,857,829 quarts, valued at $2,875,495. The most important of these were strawberries, raspberries, and loganberries. The raising of flowers for market is an important industry, the value of these products in 1909 being $5,148,949.

Live Stock and Dairy Products. The value of all live stock on farms in 1910 was $174,560,658. On January 1 of that year there were in New York, according to the estimates of the United States Department of Agriculture, 894,000 cattle other than milch cows, valued at $25,211,000; milch cows, 1,509,000, valued at $92,049,000; horses, 615,000, valued at $87,330,000; mules, 4000, valued at $608,000; sheep, 849,000, valued at $4,924,000; swine, 768,000, valued at $10,982,000. The total number of all fowls in 1910 was 10,678,836, valued at $7,879,388. The total value of the milk, cream, and butter fat sold and butter and cheese made in 1909 was $77,807,161. The milk sold amounted to 524,279,723 gallons, valued at $60,593,426. The butter made amounted to 23,461,702 pounds, valued at $6,268,386; eggs sold, $16,000,000.

Forest Products. In 1908 the area covered by forest was 47,653 square miles, about 39 per cent of the total area. New York ranks second in value of forest products. Lumbering has been one of the leading industries, and, while its maximum annual production was reached and passed more than a decade ago, the industry still ranks ninth in value of products and seventh in average number of wage earners. The total amount of lumber cut in 1913, as reported by 191 mills, was 457,720 M feet. Of all the lumber sawed, 59.4 per cent was soft wood, the most important varieties of which were hemlock, spruce, and white pine. While many varieties of hardwood lumber were reported, maple, beech, oak, and basswood, ranking in the order named, were the species cut in largest quantities, together contributing 68.6 per cent of the total output of hardwood lumber in that year. In addition there was produced on farms forest products valued at $10,365,651.

Fisheries. In value of fishery products New York in 1908 ranked third among the States. In Lake Erie, Lake Ontario, the Hudson River, Long Island Sound, and the Atlantic coast region the State possesses rich fishing grounds in close proximity to the great markets. New York is one of the few States that have both fresh and salt water fisheries on a considerable scale. The most important product is the oyster, the output of which, representing over 50 per cent of the total value of the fishing products, amounted in 1908 to $2,553,000 in value. Other important products in 1908, with their value, were as follows: squeteague, $451,000; clams, $292,000; bluefish, $291,000; flounders, $141,000; cod, $99,000. The total value of the fishery products in 1908 was $4,594,000. The industry is about evenly divided between shore and boat operations and vessel fishing. The number of persons engaged in fisheries in 1908 was 6775 and the capital invested $3,833,000.

Manufactures. Owing very largely to its geographical location, its wealth of natural resources, its abundance of water power, and its excellent natural water transportation facilities, New York, since the completion of the Erie Canal in 1825, has held the foremost rank in manufacturing. In 1909 the gross value of product per capita was $370. The table on p. 72 gives the most important figures for 1909 and 1904, relative to manufactures, for industries having an output valued at $25,000,000 or over in 1909.

In order not to disclose individual operations the figures for industries connected with the refining of sugar and petroleum are not shown.

With the exception of Pennsylvania the diversity of products is greater in New York than in any other State. Of the 264 classifications employed in the presentation of statistics for 1909 by the United States Census Bureau, 243 were represented in New York. The most important industry is the manufacture of men's and women's clothing. The manufacture of clothing under the factory system began in 1835, and in 1849 there were 976 establishments making ready-made clothing. The value of the products is steadily increasing, both in actual amount and in the proportionate value of the aggregate reported for the United States. In 1909 the value of the products of the clothing manufactories was 56.5 per cent of the total for the country and 16 per cent of the output of the State. The printing and publishing industry as a whole ranks second in the value of products in 1909, the State leading the Union in the number of newspapers and periodicals published. New York ranks third among the States in the production of the textiles. This group of industries includes the manufacture of hosiery and knit goods, carpets and rugs other than rag (in both of which New York ranks first); woolen, worsted, and felt goods; wool hats; cotton goods; cordage and twine; jute and linen goods; and fur-felt hats. The total number of spindles employed in these industries in 1909 was 1,395,482, of which 778,036 were employed in the manufacture of cotton goods. The State also ranks third in the production of foundry and machine-shop products and in the slaughtering and meat-packing industry. The manufacture of malt, distilled, and vinous liquors forms a very important group of industries. The value of the combined output for 1909 cannot be given, however, because statistics for the distilled liquor industry cannot be presented separately without disclosing the operations of individual establishments. The manufacture of malt liquors is by far the most important of the three industries. New York ranks first among the States in the manufacture of malt liquors, sixth in that of distilled liquors, and second in that of vinous liquors. New York leads all other States also in tobacco manufactures. This industry is confined largely to the manufacture of cigars and cigarettes. Details of the manufacture of lumber and timber products are given in the section *Forest Products* above. In point of value of output New York ranks second in the manufacture of flour-mill and gristmill products, which is one of the oldest industries in the State. It ranked fourth in the manufacture of iron and steel, first in the output of millinery and lace goods, first in the manufacture of electrical supplies, first in the manufacture of paper and wood pulp, third in the manufacture of boots and shoes, second in butter, cheese, and condensed milk made, first in the production of illuminating and heating gas, first in the manufacture of men's furnishing goods, third in the manufacture of automobiles and in the tanning, currying, and finishing of leather. Other industries in which it occupies first rank are the manufacture of furniture and refrigerators, fur goods, copper, tin, and sheet-iron products, patent medicines, compounds, and druggists' preparations, chemicals, musical instruments, paint and varnish, lapidary products, artificial flowers and plumes, photographic apparatus and materials, paper patterns, hair work, pens, leather gloves and mittens, tobacco pipes, jewelry and instrument cases, typewriters and supplies, and dressed furs.

The average number of wage earners engaged in manufactures in 1909 was 1,003,981, of whom 706,641 were males. The wage earners under 16 years of age numbered 7819, of whom 4004 were males. The prevailing hours of labor for more than two-thirds of the wage earners were from 54 to 60 a week. More than one-fourth were employed in establishments where the usual hours were less than 54 a week. The 51 cities and villages having more than 10,000 inhabitants in 1909 contained 85.3 per cent of the total wage earners and contributed 86.4 per cent of the total value of products for all manufacturing industries. New York City is of course the most important manufacturing city of the country. There were in this city, in 1909, 554,002 wage earners, and the value of the products of its industries was $2,029,692,576. The leading industries are the making of men's clothing, of women's clothing, and printing and publishing. The value of the products of these three industries represented 32.9 per cent of the total value of manufactured products in 1909 and employed 37.9 per cent of the average number of wage earners engaged in all manufacturing industries. Buffalo is the second city both in the number of wage earners and in the value of its manufactured products. There were in this city 51,412 wage earners, and its industrial products were valued at $218,803,994. The leading industries of this city are slaughtering and meat packing, foundry and machine-shop products, flour-mill and gristmill products, the manufacture of automobiles, soap, and malt, and printing and publishing. Rochester ranks third among the manufacturing cities.

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — THE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	44,935	1,302,241	1,003,981	$2,779,497	$557,231	$3,369,490	$1,512,586
	1904	37,194	996,725	856,947	2,031,460	430,015	2,488,346	1,139,743
Automobiles, including bodies and parts.	1909	113	11,610	9,861	25,102	7,016	30,980	16,072
	1904	35	2,101	1,849	3,347	1,227	4,260	2,353
Boots and shoes, including cut stock and findings.	1909	296	23,815	21,627	26,048	10,669	48,186	19,211
	1904	259	18,776	17,418	15,571	7,873	37,521	15,121
Bread and other bakery products	1909	3,978	29,039	21,357	38,573	13,881	86,233	33,495
	1904	3,164	22,505	17,708	24,551	10,172	61,034	24,645
Butter, cheese, and condensed milk.	1909	1,552	4,930	2,866	12,216	1,607	42,458	6,297
	1904	1,766	4,804	2,868	9,066	1,485	31,048	4,255
Chemicals	1909	74	6,869	5,746	46,465	3,376	35,346	15,637
	1904	63	5,845	4,967	23,149	2,678	23,022	10,064
Clothing, men's, including shirts	1909	2,983	104,567	91,363	119,421	48,073	266,075	130,748
	1904	2,402	73,576	64,652	72,170	29,723	187,409	92,548
Clothing, women's	1909	3,083	114,925	98,104	84,213	54,841	272,518	124,376
	1904	2,216	84,657	74,300	47,008	35,756	173,548	81,843
Copper, tin, and sheet-iron products	1909	866	17,153	14,689	37,503	8,384	38,452	17,417
	1904	495	14,725	13,142	29,603	6,724	27,314	13,705
Electrical machinery, apparatus, and supplies.	1909	217	22,819	18,972	60,427	12,479	49,290	21,807
	1904	175	18,064	16,301	30,643	9,287	35,348	17,502
Flour-mill and gristmill products	1909	983	5,120	2,990	30,270	1,669	69,802	9,332
	1904	825	4,650	3,063	24,819	1,553	54,546	7,174
Foundry and machine-shop products.	1909	1,872	75,746	64,066	208,320	40,602	154,370	92,749
	1904	1,633	69,404	60,550	153,086	35,309	127,915	78,485
Fur goods	1909	863	11,263	8,244	19,509	5,704	41,301	17,161
	1904	603	7,519	5,804	11,251	3,480	26,244	11,005
Furnishing goods, men's	1909	375	20,758	18,186	24,110	7,756	42,197	20,621
	1904	272	18,636	16,626	19,045	5,752	29,337	14,668
Furniture and refrigerators	1909	676	23,195	20,281	34,676	11,669	41,929	22,773
	1904	537	18,671	16,750	22,838	8,780	29,326	16,959
Gas, illuminating and heating	1909	141	9,221	6,422	278,607	4,364	42,347	27,329
	1904	100	8,755	7,029	224,341	4,636	35,315	24,375
Hosiery and knit goods	1909	360	37,673	35,950	52,582	14,839	67,130	28,453
	1904	271	30,694	29,365	35,310	10,160	46,320	18,110
Iron and steel, steel works and rolling mills.	1909	25	11,089	10,091	61,453	6,323	39,532	13,643
	1904	20	8,142	7,526	48,852	4,393	21,227	7,967
Liquors, malt	1909	184	10,705	8,731	127,492	7,294	77,720	58,837
	1904	209	9,896	7,977	106,799	6,364	61,958	46,113
Lumber and timber products	1909	2,263	32,458	27,471	64,491	15,101	72,530	30,825
	1904	1,599	29,867	26,013	48,937	13,221	61,677	29,216
Millinery and lace goods	1909	931	25,379	21,078	19,920	9,626	52,106	24,971
	1904	567	18,905	16,258	11,273	6,268	32,844	15,951
Musical instruments, pianos and organs, and materials.	1909	184	13,012	11,938	33,019	7,752	33,680	16,185
	1904	160	10,573	9,614	21,023	5,925	23,390	12,440
Paint and varnish	1909	147	4,741	3,047	22,002	1,863	28,559	10,664
	1904	128	4,306	3,250	20,007	1,823	25,121	8,251
Paper and wood pulp	1909	178	13,018	12,073	90,912	6,744	48,860	17,093
	1904	177	13,262	12,418	56,462	6,402	37,751	14,945
Patent medicines and compounds and druggists' preparations.	1909	743	8,566	4,728	22,484	2,226	37,343	24,754
	1904	611	6,795	4,334	18,079	1,847	28,646	19,830
Printing and publishing	1909	4,426	94,893	63,120	158,367	43,559	216,946	160,452
	1904	3,718	77,671	53,436	127,887	34,071	164,834	125,352
Slaughtering and meat packing	1909	238	7,583	6,110	34,536	4,387	127,130	16,962
	1904	151	4,654	3,761	18,102	2,592	75,550	8,772
Tobacco manufactures	1909	3,371	36,197	30,019	41,863	13,666	76,662	45,321
	1904	3,543	39,924	33,946	53,795	14,547	65,597	40,357

It had, in 1909, 39,108 wage earners and manufactured products valued at $112,676,215. The leading industries in the order of their importance are the making of men's clothing, the manufacture of photographic apparatus and materials, boots and shoes, foundry and machine-shop products, and printing and publishing. Yonkers, fourth among the manufacturing cities, contained 12,711 wage earners, and the manufactured products were valued at $59,333,865. The leading industries of the city are sugar refining, the manufacture of carpets and rugs, fur-felt hats, foundry and machine-shop products, and rubber goods. Other cities, the value of whose manufactures exceeded $10,000,000 in 1909, were Syracuse, Schenectady, Troy, Utica, Niagara Falls, Albany, Amsterdam, Binghamton, Auburn, Cohoes, Jamestown, Rome, Gloversville, Oswego, and Olean. Further information in regard to the manufactures of these and other cities will be found under their titles in alphabetical order in other portions of this work.

Transportation. The first railroad in New York was the Mohawk and Hudson, opened in 1831 from Albany to Schenectady. By 1842 there were lines extending from Albany to Buffalo. Within another decade the Erie road across the southern part of the State and the Hudson River road from New York to Albany had been completed. Since then railroads have been built over every section of the State, and the different lines have been united into great systems. The total mileage of steam-railroad track, exclusive of that within Greater New York, on June 30, 1914, was 8474. The more important roads, together with their mileage, are the New York Central and Hudson River system, including the New York Central and Hudson River (mileage 2691), the Lake Shore and Michigan Southern (68), the Dunkirk, Allegheny Valley, and Pittsburgh (42), and the Racquette Lake (24); the Erie, 948; the Delaware and Hudson, 724; the Lehigh Valley, 659; the Delaware, Lackawanna, and Western, 494; the New York, Ontario, and Western, 477; the Long Island (controlled by the Pennsylvania), 398; the Pennsylvania, 347; the Central New England, 213; the Buffalo, Rochester, and Pittsburgh, 192; the Rutland, 171; the Ulster and Delaware, 129; the Boston and Maine, 122; the Northern Central, 111; the New York, New Haven, and Hartford, 37; the Lehigh and Hudson River, 25. In addition to these roads the Central Railroad of New Jersey and the Philadelphia and Reading system, both coming into Jersey City, have ferry connections with New York City. There were also in the State, exclusive of that within greater New York City, 1996 miles of electric-railroad mileage. For mileage, etc., within greater New York City, see NEW YORK (city). Bordering upon Lakes Ontario and Erie, penetrated by the Hudson and other rivers for many miles, possessing the finest harbor on the Atlantic coast, and having within its borders several important canals, New York far outranks all other States in volume of water transportation. New York was the first State to enter actively on the work of canal construction. In addition to the Erie Canal, opened in 1825, the State has constructed the Champlain Canal, the Oswego Canal, and several other branch canals and enlarged the Erie Canal to four times its original dimensions. The total mileage of navigable waterways in 1915 was 1031. Of this, 790 was in the State Barge Canal system. See CANAL; NEW YORK (city); NEW YORK STATE BARGE CANAL; ERIE CANAL.

Banks. The paramount position of New York City in the American financial world places New York State in the lead among the States in the number and resources of its financial institutions. The first bank was the Bank of North America, incorporated in 1782. In 1791 the second bank was chartered under the name of the Bank of New York. In 1804 an Act was passed prohibiting banking and the issuing of currency except under a special charter from the Legislature. Owing to high profits, banking charters were eagerly sought and became political favors. At the time of the declaration of war with Great Britain in 1812 there were 20 banks in the State, and 24 more were chartered between 1812 and 1829. As the bank charters were for a limited number of years, and most of them were to expire in 1831, the banks in 1828 made a combined effort for a general renewal of their charters. But a strong opposition developed to this plan. The careless distribution of charters to political friends had produced bad results, and the New York currency was becoming less secure. A reform of the banking system was therefore undertaken in 1829, and the plan of securing bank circulation by the formation of a safety fund was successfully carried through. The law required all banks with new or renewed charters to contribute one-half of one per cent of their capital annually to a common safety fund, out of which losses from bank failures were to be covered. A board of three bank commissioners was created by the same Act, and quarterly examinations and annual reports provided for. An amendment to this law enacted some years later substituted the office of Superintendent of Banks for the bank commissioners, giving to that officer and his deputies and examiners supervision of all State, private, and savings banks, trust companies, loan associations, personal bankers, and loan brokers, with power to require reports and make examinations of their business conditions and methods. In 1832, 52 banks were members of the safety fund, and 12 did not belong to it.

The financial crisis of 1837 was heavily felt in New York, where the banks suspended specie payments, and bills of many concerns passed at a discount. The chartered banks became the object of popular dissatisfaction, which expressed itself in a demand for a free banking system. As a result of this agitation a free banking law was passed in 1838 which, in order to secure the bank currency, compelled the investment of the bank capital in New York State bonds or equally good securities and their deposit with the State. This was the plan afterward adopted by the Federal government in the national banking system. For some time both systems of banking worked side by side, notwithstanding a great deal of friction. For 12 years (1829–41) this safety fund was not drawn upon, as no chartered bank failed during that time. But the failure of six banks in 1841 so exhausted the fund that a law was passed in 1842 limiting the guarantee to circulation only and not to all the liabilities of the failing banks. As the charters of the chartered safety-fund banks expired, most of them reorganized under the free banking law. This was amended in 1840 by limiting the deposits to New York State bonds, as many of the other securities deposited had proved worthless. In the many bank failures during the crisis of 1841 this system of deposits proved its value, preventing serious losses on circulation.

In the financial crisis of 1857 this system was again put to a severe test, but, notwithstanding a general suspension of specie payment for some time, the banks remained firm. At the time of the introduction of the national banking system the New York banking system was not only the greatest, but also the most secure in the country. The new system was therefore not welcomed, and specially heavy taxes were imposed on the national banks. These taxes were, however, declared unconstitutional by the Federal courts. The State banks were forced to obtain national charters, and from 309 in 1863 the number of State banks was reduced to 45 in 1868. After that their number increased but slowly until 1880 (70), when a steady increase began. In recent years, however, capital has preferred the new form of organization known as trust companies, which, while, doing a general banking business, are yet different enough to have a more favorable system of taxation. Savings banks have existed in the State since 1819, and their number grew rapidly, especially after the Civil War, increasing from 71 in 1863 to 150 in 1873. Though since then their number has slightly diminished, the amount of deposits has increased immensely. The banking laws were thoroughly revised in 1914 by an Act drawn by a commission composed of experienced bankers and financiers. It made no radical changes in the existing laws, but gave wider latitude to State banks and full banking powers to trust companies. The banking laws of the State are, with this revision, looked upon as very satisfactory and have been adopted as a model for banking laws in other States. See BANK, BANKING.

The condition of the banks in New York State in 1914 is shown as follows:

1914	National banks	State banks	Private banks	Trust companies	Savings banks
Number	479	195	61	80	140
Capital	$166,419,000	$34,478,000	$2,996,423	$79,200,000	$..........
Surplus	164,854,000	39,227,000	2,035,000	137,816,000	159,345,000
Cash, etc.	307,537,000	94,396,000	817,060	120,157,000	10,441,000
Deposits	1,203,469,000	517,224,000	13,492,000	1,338,543,000	1,771,560,000
Loans	1,371,224,000	375,760,000	4,299,000	888,706,000	1,010,374,000

The system of clearing houses originated in New York City. The total exchanges for the first year (1854) were $5,633,000,000 and for the year 1914, $90,000,000,000. Consolidation has latterly become a prominent feature of the banking business of New York, about 30 small banks having been bought out by larger institutions and in many instances becoming local branches of the same. The largest financial transactions all over the country mostly emanate from New York, and, besides, New York City remains the main channel for all financial transactions between the Old and New worlds. The New York clearing house is therefore the clearing house for the whole nation. The New York money market regulates the country's money markets and is beginning to assert a dominant influence upon the European world.

Many foreign loans have been floated in New York during the last few years, especially in 1914 and 1915, when the facilities for borrowing in Europe were greatly reduced by reason of the local demand for funds for the conduct of the war. In 1914 and 1915 the National City Bank of New York established branches in Argentina, Brazil, and Uruguay under authority of the Federal Reserve Act, thus providing facilities for direct banking relations between the United States and South America.

Government. The constitution in force in 1915 was adopted by the people on Nov. 6, 1894. An Amendment may originate in either House of the Legislature, but to become effective must be adopted by two successive legislatures and finally by the voters at large. Beginning with 1916, the question of revising the constitution will be put before the people, at the general election, every 20 years.

Legislative.—The legislative power is vested in the Senate and the Assembly. The Senate consists of 50 members, chosen for two years; the members of the Assembly, chosen for one year, number 150. Enumerations and apportionments to determine the Senatorial and Assembly districts are taken every 10 years, from 1905. No person is eligible to the Legislature who at the time of his election is, or within 100 days previous thereto has been, a member of Congress, a civil or military officer of the United States, or an officer under any city government.

Executive.—The executive power is vested in a Governor and a Lieutenant Governor, Secretary of State, Comptroller, Treasurer, Attorney-General, and State Engineer or Surveyor, all chosen for terms of two years. The Governor and Lieutenant Governor must be at least 30 years of age and must have been residents of the State for at least five years preceding their election. The Superintendent of Public Works, Superintendent of State Prisons, and other officers are appointed by the Governor.

Judiciary.—The State is divided into four judicial departments, the first of which consists of the County of New York. There is an Appellate Division of the Supreme Court, consisting of seven justices in the first department and five in the others. The Governor designates from the justices elected to the Supreme Court those who shall constitute the Appellate Division. The Supreme Court consists of 101 judges, elected for a term of 14 years. There is a Court of Appeals, consisting of a chief judge and nine associate judges, elected also for a term of 14 years. The Governor may, if necessity arises, designate not more than four justices of the Supreme Court to serve as associate judges of the Court of Appeals. The jurisdiction of this court is limited to the review of questions of law. Justices of all courts must resign after they have reached the age of 70 years. The judges of the Court of Appeals form a part of the court for the trial of impeachments. Each county has a county court, the judge of which holds office for six years. In New York County there is a Court of General Sessions. Surrogates are elected for six years, except in New York County, where the term is 14 years. There are in each town justices of the peace and inferior local courts of civil and criminal jurisdiction.

Suffrage and Elections.—Every male citizen of the age of 21 who has been a citizen 90 days, an inhabitant of the State one year, a resident of the county four months and of the election district 30 days is entitled to vote. Persons convicted of bribery or other crimes against the electorate may not vote. The Legislature of 1909 passed an elaborate election law, which has since been amended in important details. General elections are held annually on the Tuesday following the first Monday in November. There are somewhat elaborate provisions in the election law for the enrollment of voters of the various parties for the purpose of participating in primary elections. Independent nominations of candidates for office to be voted for by all the voters of the State can be made only by 6000 or more voters. The electors in every city and village of 5000 or more inhabitants are required to register not later than the third Saturday prior to the election. Voting machines may be used at all elections. Each party is represented on the official ballot by a special emblem. There are, appointed by the Governor, three State Superintendents of Elections, who have the power and authority of a sheriff. The expenditures of candidates must be accounted for, and statements of receipts and disbursements must be made by State and county committees.

Local and Municipal Government.—The municipal units are cities and incorporated villages having respectively the usual city and village officers. All cities are classified according to the latest State enumeration of their population as follows: first class, population of 175,000 or more; second class, population of 50,000 and less than 175,000; third class all other cities. All special laws affecting cities must be submitted to the mayor of the city for rejection or approval.

Miscellaneous Statutory Provisions.—The State is divided into two public-service districts —the city of New York, which constitutes the first district, and the remainder of the State, the second district. Each district is under the supervision of an individual commission, which has jurisdiction over all public-service corporations. Gambling at racetracks is forbidden. There are child-labor and pure-food laws. An eight-hour day for laborers on public works is prescribed by law. There are anti-bucket-shop and loan-shark laws. A workmen's compensation law was passed by the Legislature of 1913.

Finance. At the close of the Revolutionary War the State, by the sale of public lands, formed a general fund, the revenues of which were to defray the expenses of government, and for some time this was actually accomplished. Another fund was established for school purposes. In 1814 the State even paid out of this fund the direct tax levied by the national government. A State tax became necessary after that, but was discontinued in 1826. In 1817 the State entered upon the system of public improvements, mainly canal construction, and a public debt of more than $7,000,000 was created for that purpose. At the same time a sinking fund was organized, and the tolls of the canals, as well as the salt duties, were assigned to it so as to prevent financial difficulties. After the construction of the main Erie Canal other lateral canals were undertaken, which increased the public debt. In 1827 the State entered upon a new policy of lending its credit to private companies for public improvements, and $5,228,700 was loaned to 10 companies, chiefly railroads. Some of them failed, the most important one being the Erie Railroad (in 1842). Their indebtedness ($3,665,000) became a burden upon the State fund. The total debt then amounted to more than $26,000,000, and the State was threatened with insolvency. A new course was therefore adopted in 1842. All expenditures upon public works were stopped, outstanding debts funded, and a tax imposed to meet the expenses of government and the payment of interest. The new constitution of 1846 provided for a special canal sinking fund and a general sinking fund and prohibited the creation of a new indebtedness except for war purposes, and even then only after popular sanction by a referendum. This last provision has been preserved in the present constitution. Under these strict regulations the bounty State debt of $30,000,000 was created in 1865 to meet the expenses of the Civil War, and at the end of 1866 the State debt reached its maximum of $51,753,082. After that the debt was rapidly reduced by means of the sinking fund. In 1870 it was only $38,641,606; in 1880, $9,114,055. The year 1893 saw the total extinction of the debt.

But a public debt was again created towards the year 1900 for purposes of canal improvement. After 1842 the main source of income was a direct tax upon all assessable property. Between 1890 and 1900 other sources, such as licenses, fees from foreign corporations, etc., became more important, and at the end of the nineteenth century several energetic efforts were made to separate the sources of State and local taxation. New taxes were laid upon banks, trust companies, and public franchises of corporations. Further efforts in the same direction have since been made, including the stock-transfer tax of 1905. The funded debt of the State amounted in 1914 to $159,260,660. The main sources of income were a State tax for general and sinking fund purposes, inheritance tax, excise tax, stock-transfer tax, and corporation tax. The revenue of 1914 was stated by the State Comptroller at $50,642,717, of which $7,701,272 was from direct State taxes, $42,941,445 from indirect taxes, including $9,360,099 from liquor licenses.

Militia. The males of militia age in 1910 numbered 2,156,361. The organized militia in 1913 comprised four brigades of infantry, the first including four regiments, the second three regiments, the third three regiments, and the fourth three regiments; two squadrons of cavalry; two regiments of field artillery; a corps of engineers; two companies of signal-corps troops; three corps of artillery troops; and three ambulance companies of sanitary troops, with two field hospitals. The total numerical strength on Dec. 31, 1913, was 15,551 men and 974 officers.

Population. The population by decades is as follows: 1790, 340,120; 1800, 589,051; 1810, 959,049; 1820, 1,372,111; 1830, 1,918,608; 1840, 2,428,921; 1850, 3,097,394; 1860, 3,880,735; 1870, 4,382,759; 1880, 5,082,871; 1890, 5,997,853; 1900, 7,268,894; 1910, 9,113,614. In 1915 the population reached a total of 9,773,817. From fifth rank in 1790 the State advanced to first place in 1820 and has held this position ever since. The density per square mile in 1910 was 191.2, New York being exceeded only by four other States in this regard. This is accounted for by the large urban population, which in that year amounted to 7,185,494. The rural population was 1,928,120. The native whites of native parentage in 1910 numbered 3,230,325, native whites of foreign or mixed parentage 3,007,248, and negroes 134,191. The location of New York City as a gateway to the large foreign immigration to the United States has resulted in giving this State an abnormally large foreign element. The foreign-born population in 1910 amounted to 2,729,272, almost twice as many as in any other State. Of the foreign-born population in 1910, 558,952 came from Russia, 472,192 from Italy, 436,878 from Germany, and 368,777 from Ireland. Combined these amounted to 67.3 per cent of the entire foreign population. Of the native population in 1910, 88.7 per cent was born in the State, 2.6 per cent in Pennsylvania, and 1.6 per cent in New Jersey. By sex the population was divided in 1910 into 4,584,597 males and 4,529,017 females. Males of militia age (18 to 44 years) numbered, in 1910, 2,156,361, those of voting age 2,836,773, and females of voting age 2,858,227. There were nine cities with a population of 50,000 or more. These, with their populations in 1910 and as estimated in 1914, are: New York City, 4,766,883 and 5,333,539; Buffalo, 423,715 and 454,112; Rochester, 218,149 and 241,518; Syracuse, 137,249 and 149,352; Albany, 100,253 and 102,961; Yonkers, 79,803 and 93,383; Troy, 76,813 and 77,560; Utica, 74,419 and 82,060; Schenectady, 72,826 and 90,503.

Education. Schools were established by the Dutch on Manhattan Island before the middle of the seventeenth century. Under English rule educational efforts were limited chiefly to the founding of a college for the education of candidates for the Church. (See COLUMBIA UNIVERSITY.) The first measure looking towards elementary education was passed in 1795 and forms the basis of the present system. In 1805 the sale of State lands provided a permanent school fund. After various unsuccessful efforts a free-school bill was passed by the Legislature in 1851. In 1904 an educational unification Act was passed, under which a body known as the Regents of the University have general control of the educational policy of the State. These regents are elected by the Legislature, the term of one member expiring each year. The chief executive is the State Commissioner of Education, with three assistant commissioners.

The number of illiterates, taking into consideration the large foreign-born population, is relatively small. The illiterates 10 years of age or over in 1910 numbered 406,020, or 5.5 per cent of the total population. Among native whites of native parentage the percentage was 0.8, among native whites of foreign or mixed parentage 0.7, and among foreign-born whites 13.7. The last named numbered 362,025.

The total school population, ages 6 to 20 years, in 1910 was 2,454,428, of which 1,563,374 attended school, a percentage of 63.7. The total school enrollment on July 31, 1913, was 1,485,706 and the average daily attendance for the year 1,182,656. In the same year there were in the day schools 45,359 teachers, whose average yearly salary was $935.70. The total expenditure for the public schools in 1912 was $59,063,976, and the investment in schools and equipment amounted to over $200,000,000. The most marked advance in the educational work in recent years has been in the direction of vocational training. Vacation or summer schools are held in about 20 cities. A feature of unusual interest is the open-air school maintained in about 10 cities for anæmic children. The compulsory-attendance law provides for the attendance of children of school age in cities and villages of 5000 or more population on every day of the school session. In rural districts the law is somewhat modified. Secondary education has had special attention. In 1912 there were 718 high schools, in which were 134,941 pupils and 5178 teachers. In the same year there were 171 private academies, with an attendance of 14,146 pupils. The State controls the professional and technical schools through the examinations by the regents of candidates for admission. The State normal schools are at Brockport, Buffalo, Cortland, Fredonia, Geneseo, New Paltz, Oneonta, Oswego, Plattsburg, and Potsdam. These are attended annually by about 7500 students. In each county teachers' training classes are carried on during the year.

The chief institutions of higher education are Adelphi College at Brooklyn, Alfred University at Alfred, Clarkson Technical School at Potsdam, College of the City of New York at New York, Colgate University at Hamilton; Columbia University at New York, including Teachers College and Barnard College (for women); Cornell University at Ithaca, Elmira College at Elmira, Fordham University at New York, Hamilton College at Clinton, Hobart College at Geneva, Hunter College (formerly Normal College) of the City of New York at New York, Manhattan College at New York, New York University at New York, Niagara University at Niagara, Polytechnic Institute at Brooklyn, Pratt Institute at Brooklyn, Rensselaer Polytechnic at Troy, Rochester University at Rochester, St. Lawrence University at Canton, Syracuse University at Syracuse, Union University at Schenectady, Vassar College (for women) at Poughkeepsie, William Smith College (for women) at Geneva, and the United States Military Academy at West Point.

Charities and Corrections. The charitable and correctional institutions are under the supervision of three boards: the State Board of Charities, the State Commission in Lunacy, and the State Commission of Prisons. The Board of Charities is empowered by the constitution to visit and inspect all institutions, whether State, county, or municipal, which are of a charitable or correctional nature, except those which fall under the supervision of the other two commissions. The board consists of 12 members, appointed by the Governor. Under the supervision of this board there were in 1915 over 700 institutions, with an average daily population of more than 70,000. They expend annually in their work over $25,000,000. There were, in 1915, 18 State charitable institutions subject to the jurisdiction and inspection of the board. Among these are the State Agricultural and Industrial School; Syracuse State Institution for Feeble-Minded Children, Syracuse; New York State School for the Blind, Batavia; Thomas Indian School, Iroquois; State Custodial Asylum for Feeble-Minded Women, Newark; New York State Soldiers and Sailors Home, Bath; New York State Training School for Girls, Hudson; Western House of Refuge for Women, Albion; New York State Reformatory for Women, Bedford; Rome State Custodial Asylum, Rome; Craig Colony for Epileptics, Sonyea; New York State Woman's Relief Corps Home, Oxford; New York State Hospital for the Care of Crippled and Deformed Children, West Haverstraw; New York State Hospital for the Treatment of Incipient Pulmonary Tuberculosis, Raybrook. In addition there are 10 schools and institutions under private management, but mainly supported by State appropriations. There are eight schools for the deaf which are in receipt of public moneys.

The State Commission in Lunacy is required to visit and inspect all institutions, either public or private, used for the cure and treatment of the insane, not including institutions for epileptics or idiots. The asylums for the insane are the Utica, Willard, Poughkeepsie, Middletown, Buffalo, Binghamton, St. Lawrence, Rochester, King's Park, Long Island, Manhattan, Central Islip, Gowanda, Hudson River, Mohansic, Matteawan, and Dannemora.

The State prisons are under the supervision of the State Prison Commission and under the direct authority of the State Superintendent of Prisons, who is appointed by the Governor. There are prisons at Auburn, Clinton, Ossining (Sing Sing), and Great Meadows. The State prison for women is at Aúburn. The Elmira Reformatory and the Eastern New York Reformatory are for boys. The prison population, including those in State prisons, county jails, and New York City prison and workhouse, was 16,673 in 1914. For a general discussion of matters connected with the method of administering the prisons, see PENOLOGY.

Religion. The large immigration into New York has resulted in a very rapid increase of the Roman Catholic and the Jewish populations. Particularly in New York City have these two elements become prominent. Among the Protestant denominations the Methodists are the most numerous, followed by the Presbyterians, Episcopalians, Baptists, Lutherans, Reformed Church in America, and Congregationalists. Protestantism in New York City is characterized by the prominence of the Episcopal church, this church being much stronger there than elsewhere in the Union.

History. New York Bay was discovered by Verrazano in 1524, but, though Portuguese, French, and Spanish navigators in all probability visited the harbor during the sixteenth century, no important explorations were made before 1609, when Samuel de Champlain and Henry Hudson, sailing in the *Half Moon* under the Dutch flag, entered the limits of the present State. Champlain's action in lending the Huron Indians aid against the Iroquois imbued the Five Nations with an implacable hatred for the French and to a great extent determined in advance the fate of their colonizing schemes in America. Hudson's account of New Netherland, as he named the region, and of the great river, called at first Mauritius, then North, and finally Hudson, which he had ascended to the highest navigable point, led Dutch merchants, eager for furs, to dispatch trading vessels to the new country in 1610 and subsequent years. Just below Albany Captain Christiansen built Fort Nassau in 1613, and about the same time a number of traders built their posts on Manhattan Island. With the founding of the West India Company in 1621 a fairly active immigration began. A number of Walloons brought over by Captain May in 1623 were settled on Manhattan Island, on Long Island, and up the Hudson at Fort Orange (later Albany), founded in 1622. In 1626 Peter Minuit was made director general of the company and bought Manhattan Island from the Indians. (See NEW YORK (city), *History*.) The greater part of the population of New Netherland were agents of the company, whose object in the main was trade and not colonization; and as it guarded its monopoly jealously and offered few inducements to permanent settlers, progress for a few years was slow. In 1629 the patroon system, a system of feudal tenure on an extensive scale, was established. Kilian Van Rensselaer purchased a large tract of land in the neighborhood of Albany, and Michael Pauw bought Staten Island and Pavonia. The acquisition of land continued under Wouter Van Twiller (q.v.), who came over in 1633, and under Kieft (q.v.), who succeeded Van Twiller in 1638. The abandonment of the company's trade monopoly was followed by a large influx of colonists, among whom were many English Puritans and French Huguenots. The population was cosmopolitan even in 1643, when, according to Father Jogues, 400 or 500 inhabitants spoke 18 different languages and were divided into Calvinists, Lutherans, Roman Catholics, Puritans, Baptists, and other denominations. Wars with the Algonquin Indians, caused by the greed of Kieft, brought the Colony near to destruction. The settlements around New Amsterdam were wiped out, and the town itself was threatened. In the moment of highest danger Kieft was forced by popular demand to appoint a council of eight to assist him in carrying on the war. This was the beginning of representative government in New York. Peter Stuyvesant (1647–64) appointed a council of nine to advise him and acted in systematic opposition to it. Defying alike the popular will and the orders of the States-General in Holland, he ruled, arrested, confiscated, silenced public speech, and dictated the outline for the Sunday sermon. New Amsterdam received a burgher government in 1653, but Stuyvesant had the appointment of the magistrates. He upheld bravely the rights of the company against the Swedes on the Delaware, whom he dispossessed, and the English in Connecticut and Long Island, but the citizens grew weary of him and yielded in 1664 to an English fleet under Colonel Nicolls, which had come to enforce the Duke of York's title to the region. New Netherland became New York and was ruled by the Duke's governors and the Duke's laws. Taken by the Dutch in 1673, it was returned to England in the following year. At the time of the English occupation New Netherland had a population of about 8000, comprising many nationalities, with the Dutch predominant. Life in the Colony had not that deep spiritual tinge which it bore in New England, but it was more gracious and more free.

The churches were well supported, and the school system was excellent. In religion a broad toleration, in social life a hearty gayety and timely hospitality marked this cosmopolitan Colony.

The Dutch did not take kindly to the English rule in the beginning. The desire of the people for some share in the government remained unsatisfied. Complaints against the arbitrary imposition of taxes and customs culminated in a demand, expressed in the form of petitions, for a popular Assembly, and this was finally granted in 1683, when a Provincial Assembly summoned by Governor Dongan passed the Charter of Liberties, granting freedom of religion to all Christians and the suffrage to all freeholders. An important treaty with the Iroquois in 1684 confirmed the alliance between them and the English and made them definitely the enemies of the French, who retaliated with punitive expeditions into the country, in 1687 under Denonville and later, repeatedly, under Frontenac. In 1686 New York and Albany obtained new charters, but in the following year the Provincial Assembly was dissolved, absolute rule was restored, and New York became a part of the Dominion of New England, under Governor Andros. The revolution of 1688 in England found two parties in the Colony—the richer classes, who were loyal to James II, and the popular majority, in favor of William of Orange. Exaggerated reports of Roman Catholic intrigues caused Jacob Leisler (q.v.) to seize the fort at New Amsterdam in the name of William and Mary. A Committee of Safety made him commander in chief, and the popular Assembly in 1689 gave him autocratic power. He held the fort against a force of troops from England, but willingly laid down his authority when Governor Sloughter, the King's appointee, arrived.

The period from 1690 to the Revolution was marked by almost continuous disputes between the Governor and the Assembly on the questions of the Governor's salary, the collection and the disposal of the revenue, the control of the courts, and the establishment of an endowed Church. The governors bargained with the Assembly for an increase in salary, participated in gigantic land frauds in common with minor officials and prominent citizens, and in one instance, the notable case of Governor Fletcher (1692–98), shared in the profits of piracy. There were, however, governors of a far higher character, men like Bellomont (1698–1701), Robert Hunter (1710–19), or William Burnet (1720–28), who was an ardent champion of the royal power, but nevertheless an honest man and zealous for the welfare of the province. But in spite of political turmoil the growth of the Colony was rapid and uninterrupted. In 1720 the population consisted of 31,000 whites and 4000 negroes; in 1756 it comprised 83,000 whites and 13,000 negroes; and, in 1771, 168,000 whites and negroes. The first newspaper, the *Gazette*, a government organ, was published in 1725, and the second, the *Weekly Journal*, an opposition sheet, appeared in 1733. For his criticism of the Governor's conduct the editor of the *Weekly Journal*, John Peter Zenger (q.v.), was brought to trial for libel in 1734, but, supported by the people and the Assembly, he won his case and vindicated the freedom of the press in New York. In 1746 the Assembly appropriated £250 towards the foundation of King's College. In the early French and Indian wars New York suffered heavily, for, owing to the factious disputes between the Governor and the Assembly, the border was left without any troops, and the frontier settlements were swept clean by the French and their Indian allies. In 1690 Schenectady was destroyed. Sir William Johnson kept the Iroquois friendly to the English, and the alliance with them was strengthened at the Albany Convention of 1754 (q.v.). By the Treaty of Fort Stanwix in 1768 a definite line of delimitation between the English and the Indian territory was traced.

As early as 1762 petitions and remonstrances against the oppressive commercial laws had been submitted to Parliament and the King. In 1764 the Assembly appointed a committee to correspond with the other provinces concerning the common cause, and in October, 1765, a Colonial Congress assembled at New York. The imposition of the stamp duty was followed by the outbreak of disorder, in which the Sons of Liberty (q.v.) were prominent, and nonimportation agreements were entered into by the people. Though the commercial interests of the Colony suffered greatly, the Assembly refused to vote supplies for the troops, and on Jan. 18, 1770, the Sons of Liberty and the British soldiers fought the battle of Golden Hill on John Street in the city of New York. There was peace till 1773, when the arrival of tea ships aroused the Sons of Liberty to renewed activity. By 1775 the Provincial Assembly had become devotedly Tory and unrepresentative of popular opinion. On April 20 a Provincial Congress, comprising representatives of seven counties outside of New York City, met at New York and elected delegates to the Continental Congress. Upon the news of the battle of Lexington a committee of 100 took possession of the government and issued a call for a provincial convention, which assembled July 10, 1776, at White Plains and subsequently removed to Kingston, where it adjourned April 20, 1777, after drawing up a constitution for the State of New York. For military events during the War of the Revolution, see UNITED STATES.

The Articles of Confederation were ratified in 1778. Two years later New York ceded its public lands in the west to Congress, and in 1786 it terminated its dispute with Massachusetts by granting it the right of preëmption to about 6,000,000 acres of land in the western part of the State. Of this vast tract more than 3,500,000 acres came by purchase into the possession of Robert Morris (q.v.), who disposed of a large area to a number of citizens of Amsterdam, who in 1798 were authorized by the Legislature to hold land within the State. This tract came to be popularly known as the Holland Purchase. The dispute regarding the possession of Vermont, to which New York laid claim, was settled by the erection of an independent State, Vermont being admitted into the Union in 1791. The fear of too strong a central government and the desire to retain possession of its rich customhouse made New York ill-inclined towards the newly framed Federal Constitution. Two of its three delegates withdrew from the Federal convention, and only after 10 States had adopted the Constitution did a State convention ratify it, by 30 votes to 27 (July 26, 1788). From the very outset party lines were sharply drawn in the State. The Federalists were led by Alexander Hamilton, John Jay, and General Schuyler. Among the leaders of the various factions of the Republicans were the two Clintons—George and De Witt—the Livingstons, and Aaron Burr. Federalist from 1795 to 1800, the State became Republican after that year and passed under the domination of De Witt Clinton, who remained in power till 1822, except for a brief period of eclipse between 1815 and 1817. The followers of the ascendant faction were rewarded with the grant of bank charters and valuable franchises, and, favored by the provisions of the constitution, which gave the power of appointment to office and removal to a council of appointment, the spoils system was developed to perfection and was introduced later by Van Buren into national politics. To De Witt Clinton is due the rise of the canal system which brought such prosperity to the State. The project of an Erie Canal had been discussed by Gouverneur Morris in 1777, it was revived by Clinton in 1810, and work on the Erie Canal was begun in 1817 and terminated in 1825. The success of the undertaking brought about Clinton's election to the governorship in 1824 and 1826, though his political following had really been shattered.

Clinton was succeeded in power by the Albany Regency (q.v.), a group of men headed by Martin Van Buren, Silas Wright, William L. Marcy, and John A. Dix, who made machine politics an exact science. Personal rivalries and short-lived popular movements determined the general course of events. From 1836 to 1842 the Antimasonic agitation (see ANTIMASONS) was powerful enough to decide the outcome of State elections. The antirent troubles originating in the grievances of the farmers against their landlords—the successors of the patroons and the great land companies—lasted from 1836 to 1846, when feudal tenure was abolished by the new constitution. (See ANTIRENTISM.) The attitude of the Democrats towards such questions as Antimasonry, State and national banks, and the canal system was not uniform. Dissensions between the Conservatives (see HUNKERS) and the Radicals (see BARNBURNERS) enabled the Whigs to carry the State in 1838. After 1840, when the Liberty party arose, the antislavery feeling was strong in the agricultural parts of the State, and in 1848 the Barnburner Democrats, led by Van Buren, broke away to aid in forming the Free-Soil party. The Whigs and Know-Nothings gained and lost power in swift succession before the Civil War broke out. The mercantile and manufacturing classes in 1860 advocated peace at any price, but the mass of the people were Unionist. The reaction following upon the disasters of the first year and a half of the war put the Democrats into power. In July, 1863, occurred the draft riots in New York City. (See DRAFT RIOTS IN NEW YORK.) The war measures of President Lincoln were denounced violently by the State authorities, and the election of 1864 was bitterly fought, the outcome being decided in favor of the Republicans by the votes of the men at the front.

The economic development of New York has continued uninterrupted since the war and has fully justified its title of the Empire State. The period in general presents a dead level of partisan rule relieved by occasional spasmodic upheavals of civic virtue. The gubernatorial power, nevertheless, has been repeatedly in the hands of able men, several of whom attained national eminence. From 1863 to 1871 New York City was ruled by the notorious William M. Tweed (q.v.). In 1875, and again in 1899, frauds in connection with the management of the State canals, involving high officials and others, together known as the Canal Ring, were discovered. In the assignment of public contracts much dishonesty was displayed. The State capitol at Albany and the county courthouse at New York are monuments of what patient industry may accomplish in the way of nursing a modest estimate into an enormous defalcation. Many attempts, however, were made to remedy political evils by legislation. Laws were passed to check lobbying, to insure honest party primaries, and to reform the civil service. The question of tax reform was an important subject of legislation after 1880 and brought the State into conflict with the powerful railway, gas, and insurance corporations upon the question whether their capital stock and the value of their franchises were subject to taxation or not. The rise of the Labor party in 1886 was the cause of much important labor legislation. Laws limiting the hours of daily work and protecting women and children in factories and shops were passed in 1892 and subsequently. Much attention has been devoted to the preservation of the Adirondack forests. In 1867 the public schools of the State were made entirely free, and in 1875 primary education was made compulsory.

The constitution of 1777 was revised in 1821; the councils of revision and appointment were abolished, and the Governor received the veto power. Many offices formerly filled by appointment were made elective, and in general the new constitution represented a great advance towards democracy. This tendency was continued in the constitution of 1846, which put an end to feudal tenure in lands, abolished the Court of Chancery, established a Court of Appeals, and made all judges of the higher courts elective. By amendments adopted in 1869, 1874, and 1882 further reforms in the judiciary were carried out, negro voters were freed from the property qualification hitherto imposed upon them, penalties for bribery and corruption in office were established, and the canals were freed from toll. Of the 34 amendments submitted to the people by the Constitutional Convention of 1894, the most important among those adopted were concerned with the reform of the judiciary, the shortening of the Governor's term to two years, and the reapportionment of the legislative districts of the State.

New York is an uncertain State both in national and State elections, and the influence exerted by its large electoral vote on the outcome of presidential contests has given it the well-earned name of the pivotal State. Notable cases were the elections of 1844, 1848, and 1884. In the presidential election of 1844 James K. Polk, the Democratic candidate, received 170 votes in the electoral college as against 105 votes cast for Henry Clay, the Whig candidate. The 36 electoral votes of New York, which Polk carried by a small plurality, were sufficient to decide the election. In 1848 the dissensions in the Democratic party in the State enabled Taylor to secure the presidency. In 1884 Cleveland, the Democratic candidate, carried the State by a plurality of 1149 and secured the presidency. New York voted for the Republican candidates from 1796 to 1808. In 1812 it cast its vote for De Witt Clinton, who had been nominated by the section of the Republican party opposed to the domination of the congressional caucus and had been indorsed by the Federalists. It voted for Monroe in 1816 and 1820, divided its vote among Adams, Crawford, Clay, and Jackson in 1824 (26 out of 36 for Adams) and between Adams and Jackson in 1828 (20 out of 36 for Adams). It was Democratic in 1832, 1836, 1844, and 1852 and Whig in 1840 and 1848. From 1856 to 1864 it was Republican and then entered on a course of vacillation. It voted for Seymour (Democrat) in 1868, Grant (Republican) in 1872, Tilden (Democrat) in 1876, Garfield (Republican) in 1880, Cleveland (Democrat) in 1884, Harrison (Republican) in 1888, Cleveland (Democrat) in 1892, McKinley (Republican) in 1896 and 1900, and Roosevelt (Republican) in 1904. In 1906 the Democrats elected all State officers except Governor.

In 1906 Charles E. Hughes, through his successful conduct of an investigation into the conditions prevailing in the great life-insurance corporations, became the conspicuous political figure of the State. He was elected Governor by the Republicans, defeating W. R. Hearst, the Democratic candidate, by about 60,000 votes. Governor Hughes, though strongly opposed, was able to have passed through the Legislature in 1907 several important measures, including one creating a Public Service Commission with wide powers. He succeeded also, in 1908, in bringing about the passage of measures prohibiting gambling at racetracks. In 1908 Governor Hughes, although the leading politicians of the State strongly opposed him, was reelected by about 70,000 plurality. In the presidential election of 1908 Taft received 870,000 votes and Bryan 667,468. In 1910 Senator Jotham P. Allds, Republican leader of the Senate, was charged with receiving bribes for assistance in passing certain measures and after a prolonged trial was found guilty. This was followed by a general investigation into conditions in the Legislature by a committee of the Senate.

Theodore Roosevelt in 1910 appeared as an advocate of the primary laws desired by Governor Hughes and as an opponent of the State Republican machine. After a bitter struggle he was chosen temporary chairman of the State Convention and with his supporters nominated Henry L. Stimson for Governor. The Democratic Convention, which was controlled by Tammany Hall, nominated John A. Dix for Governor. The Democrats elected Dix, all the other State officers, and a majority of the Legislature, thus gaining control of the State for the first time since the administration of David B. Hill. The Progressive party did not in 1912 attain to the proportionate power in New York that it did in certain other States. In the election on Nov. 3, 1912, Wilson received 665,475 votes, Taft 455,428, and Roosevelt 390,021. For Governor, William Sulzer (Democrat) received 649,559, Job E. Hedges (Republican) 444,105, and Oscar S. Straus (Progressive) 393,183.

The administration of William Sulzer (q.v.) was a stormy one. During the summer of 1913 a committee of the Senate was appointed to investigate certain charges that had been brought against the Governor, and as a result articles of impeachment were passed by the Assembly on Aug. 12, 1913. The Court of Impeachment on October 16 found Governor Sulzer guilty and on October 18 voted to remove him from office. Following Governor Sulzer's removal Martin H. Glynn, Lieutenant Governor, took his place. He called a special session of the Legislature in December and recommended the passage of legislation providing for the Massachusetts form of ballot, or direct-primary law, and a workmen's compensation law. These passed by an almost unanimous vote, as well as a measure providing for a constitutional convention to be held in 1915. Mr. Sulzer was elected to the Assembly on the Progressive ticket in the November elections. In the election of 1914 Governor Glynn, candidate for the governorship, was defeated by Charles S. Whitman, Republican district attorney for the County of New York. Mr. Sulzer was a candidate for reelection on an Independent ticket. The vote was Whitman 686,701, Glynn 412,253, Sulzer 70,655. The Legislature was returned Republican. The Legislature of 1915 passed a measure increasing direct taxation by about $19,000,000. The Constitutional Convention, under the presidency of Elihu Root, began its session at Albany in April, 1915. A constitutional amendment providing for woman suffrage was submitted to the people in 1915.

The following is a list of the Governors of New York as a Colony and a State:

DIRECTORS GENERAL OF NEW NETHERLAND

Cornelis Jacobsen May	1624–25
William Verhulst	1625–26
Peter Minuit	1626–33
Wouter Van Twiller	1633–38
William Kieft	1638–47
Peter Stuyvesant	1647–64

ENGLISH COLONIAL GOVERNORS

Richard Nicolls	1664–68
Francis Lovelace	1668–73

DUTCH OCCUPATION

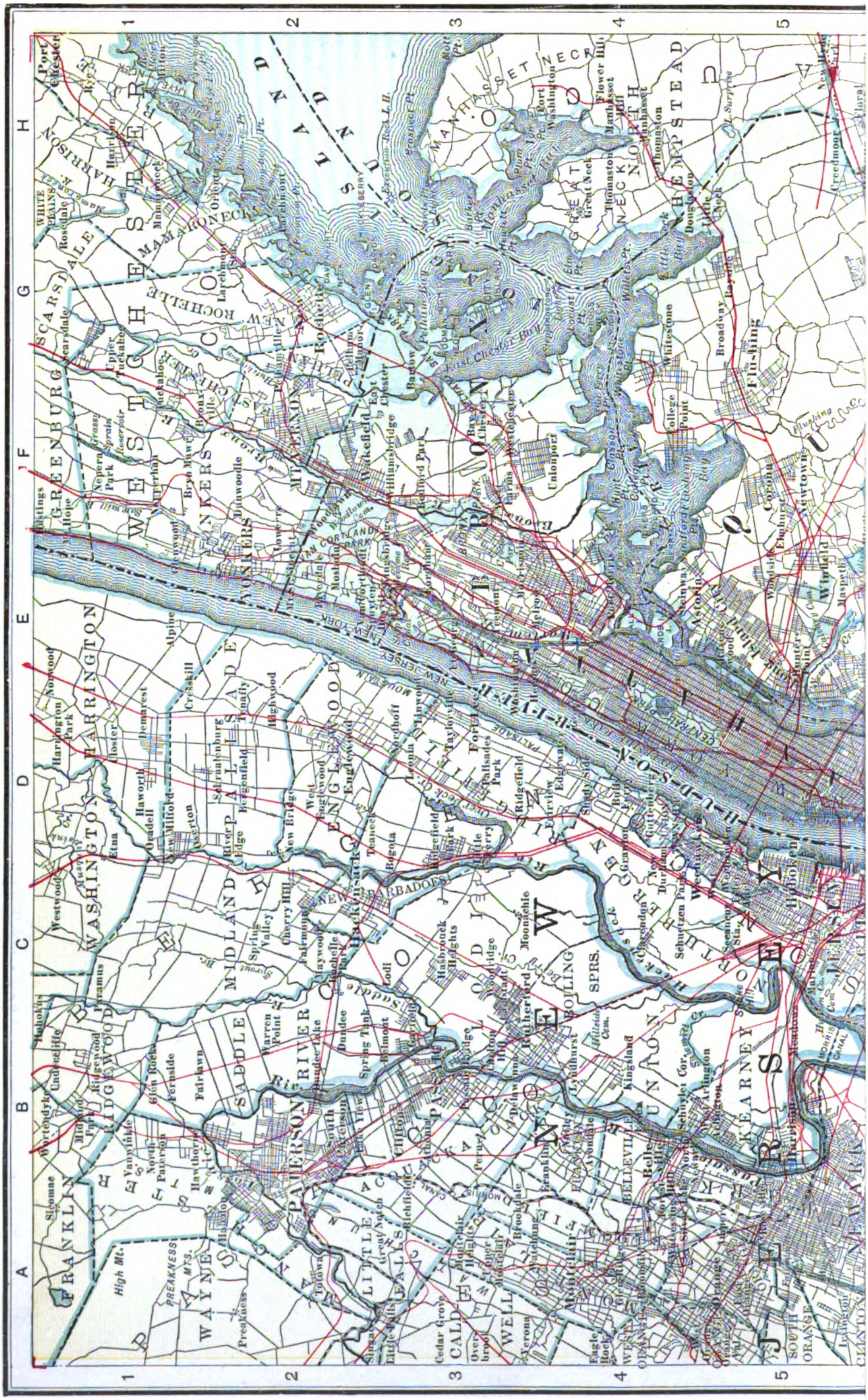
Anthony Colve	1673–74

ENGLISH COLONIAL GOVERNORS

Edmund Andros	1674–83
Thomas Dongan	1683–88
Francis Nicholson (Lieutenant Governor under Governor-General Andros)	1688–89
(Jacob Leisler)	1689–91
Henry Sloughter	1691
Major Richard Ingoldsby (acting)	1691–92
Benjamin Fletcher	1692–98
Richard Coote, Earl of Bellomont	1698–1701
John Nanfan (acting)	1701–02
Edward Hyde, Lord Cornbury	1702–08
John, Lord Lovelace	1708–09
Richard Ingoldsby (acting)	1709–10
Gerardus Beekman (acting)	1710
Robert Hunter	1710–19
Peter Schuyler (acting)	1719–20
William Burnet	1720–28
John Montgomerie	1728–31
Rip Van Dam (acting)	1731–32
William Cosby (acting)	1732–36
George Clarke	1736–43
George Clinton	1743–53
Danvers Osborne	1753
James de Lancey (acting)	1753–55
Charles Hardy	1755–57
James de Lancey (acting)	1757–60
Cadwallader Colden (acting)	1760–61
Robert Monckton	1761
Cadwallader Colden (acting)	1761–65
Henry Moore	1765–69
Cadwallader Colden (acting)	1769–70
John Murray, Lord Dunmore	1770–71
William Tryon	1771–77

STATE GOVERNORS

George Clinton		1777–95
John Jay		1795–1801
George Clinton	Democratic-Republican	1801–04
Morgan Lewis	" "	1804–07



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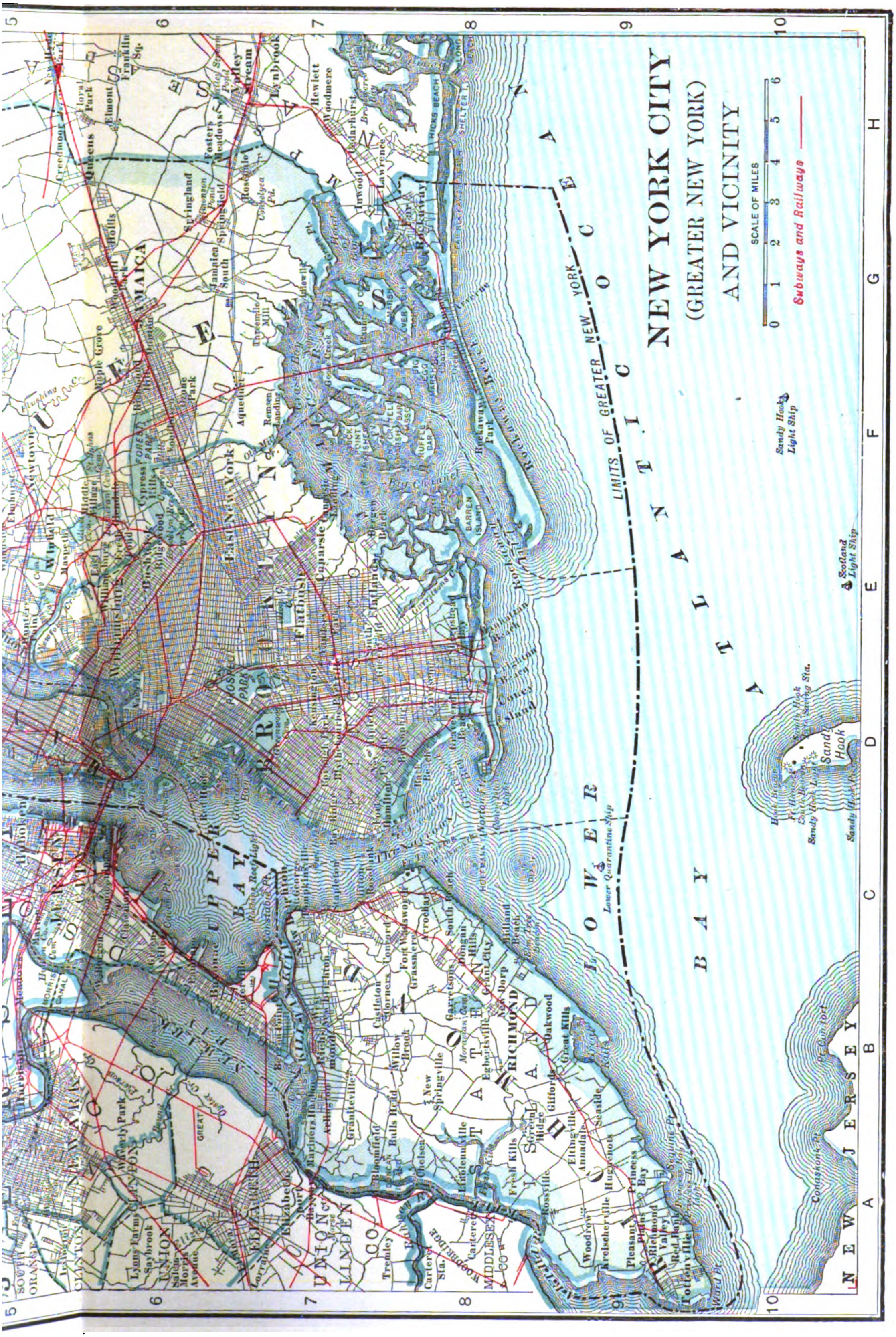
WESTCHESTER
GREENBURG
SCARSDALE
HARRISON
MAMARONECK
NEW ROCHELLE
YONKERS
EASTCHESTER
PELHAM
LONG ISLAND SOUND
MANHASSET NECK
GREAT NECK
NORTH HEMPSTEAD
BRONX
QUEENS
HUDSON RIVER
NEW YORK
NEW JERSEY
HARRINGTON
WASHINGTON
PALISADE
ENGLEWOOD
RIDGEFIELD
BERGEN
MIDLAND
SADDLE RIVER
RIDGEWOOD
FRANKLIN
WAYNE
PASSAIC
LITTLE FALLS
CALDWELL
LODI
NEW BARBADOES
UNION
KEARNEY
BELLEVILLE
NEWARK
WEST ORANGE
SOUTH ORANGE
JERSEY CITY
HOBOKEN
NORTH BERGEN
BOILING SPRS.
Paterson
Hackensack
Flushing
Yonkers
Port Chester
Rye
White Plains
Mamaroneck
New Rochelle
Mt. Vernon
Hastings
Montclair
Orange
Newark
Jamaica


NEW YORK CITY
(GREATER NEW YORK)
AND VICINITY
SCALE OF MILES
0 1 2 3 4 5 6
Subways and Railways
LIMITS OF GREATER NEW YORK
ATLANTIC OCEAN
LOWER BAY
UPPER BAY
Lower Quarantine Sta.
Sandy Hook Light Ship
Scotland Light Ship
Sandy Hook
NEW JERSEY
STATEN ISLAND
RICHMOND
BROOKLYN
QUEENS
JAMAICA
Flatbush
Coney Island
Rockaway Beach
Long Beach
Jamaica Bay
Newark
Elizabeth
Jersey City
Hoboken
A B C D E F G H
5 6 7 8 9 10

STATE GOVERNORS—*Continued*

Daniel D. Tompkins	Democratic-Republican	1807–16
John Taylor (acting)	" "	1816–17
De Witt Clinton	" "	1817–23
Joseph C. Yates	" "	1823–25
De Witt Clinton	" "	1825–28
Nathaniel Pitcher (acting)	" "	1828–29
Martin Van Buren	Democrat	1829
Enos T. Throop (acting)	"	1829–31
Enos T. Throop	"	1831–33
William L. Marcy	"	1833–39
William H. Seward	Whig	1839–43
William C. Bouck	Democrat	1843–45
Silas Wright	"	1846–47
John Young	Whig	1847–49
Hamilton Fish	"	1849–51
Washington Hunt	"	1851–53
Horatio Seymour	Democrat	1853–55
Myron H. Clark	Whig	1855–57
John A. King	Republican	1857–59
Edwin D. Morgan	"	1859–63
Horatio Seymour	Democrat	1863–65
Reuben E. Fenton	Republican	1865–69
John T. Hoffman	Democrat	1869–73
John Adams Dix	Republican	1873–75
Samuel J. Tilden	Democrat	1875–77
Lucius Robinson	"	1877–79
Alonso B. Cornell	Republican	1879–83
Grover Cleveland	Democrat	1883–84
David Bennett Hill (acting)	"	1884–86
David Bennett Hill	"	1886–92
Roswell P. Flower	"	1892–95
Levi P. Morton	Republican	1895–97
Frank S. Black	"	1897–99
Theodore Roosevelt	"	1899–1901
Benjamin B. Odell, Jr.	"	1901–04
Frank W. Higgins	"	1904–07
Charles E. Hughes	"	1907–11
John Alden Dix	Democrat	1911–13
William Sulzer	"	1913
Martin H. Glynn (acting)	"	1913–15
Charles S. Whitman	Republican	1915–

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NEW YORK. The chief city of the State of New York, the commercial metropolis of the United States, the largest city of the Western Hemisphere, and after London the largest city in the world. It is situated at the mouth of the Hudson River, which enters the Atlantic Ocean through New York Bay, 205 miles in a direct line northeast of Washington, 715 miles east by south of Chicago, and 190 miles southwest of Boston; lat. of the City Hall, 40° 42′ N., long. 74° W.

The climate, on the whole, is very healthful and enjoyable, but is subject to great extremes. As the continental climate extends to the Atlantic coast of North America, the temperatures of New York City depend, to an important extent, upon the meteorological conditions of the interior regions. The humidity due to the proximity of the sea tends to increase the discomfort both of oppressively hot and severely cold days. The average annual temperature is about 54° F. The mean temperature of the three winter months is about 34° F.; spring, 52° F.; summer, 75° F.; autumn, 57° F. July is almost invariably a little warmer than the other summer months. The temperature of the hottest day ranges from 90° F. to 99° F., and the mercury sometimes falls to zero or even below. The annual precipitation is from 36 to 42 inches, the amount of snow being from 20 to 30 inches. Cyclonic storms from the West Indies occasionally bring very high winds, accompanied with a heavy fall of rain or snow.

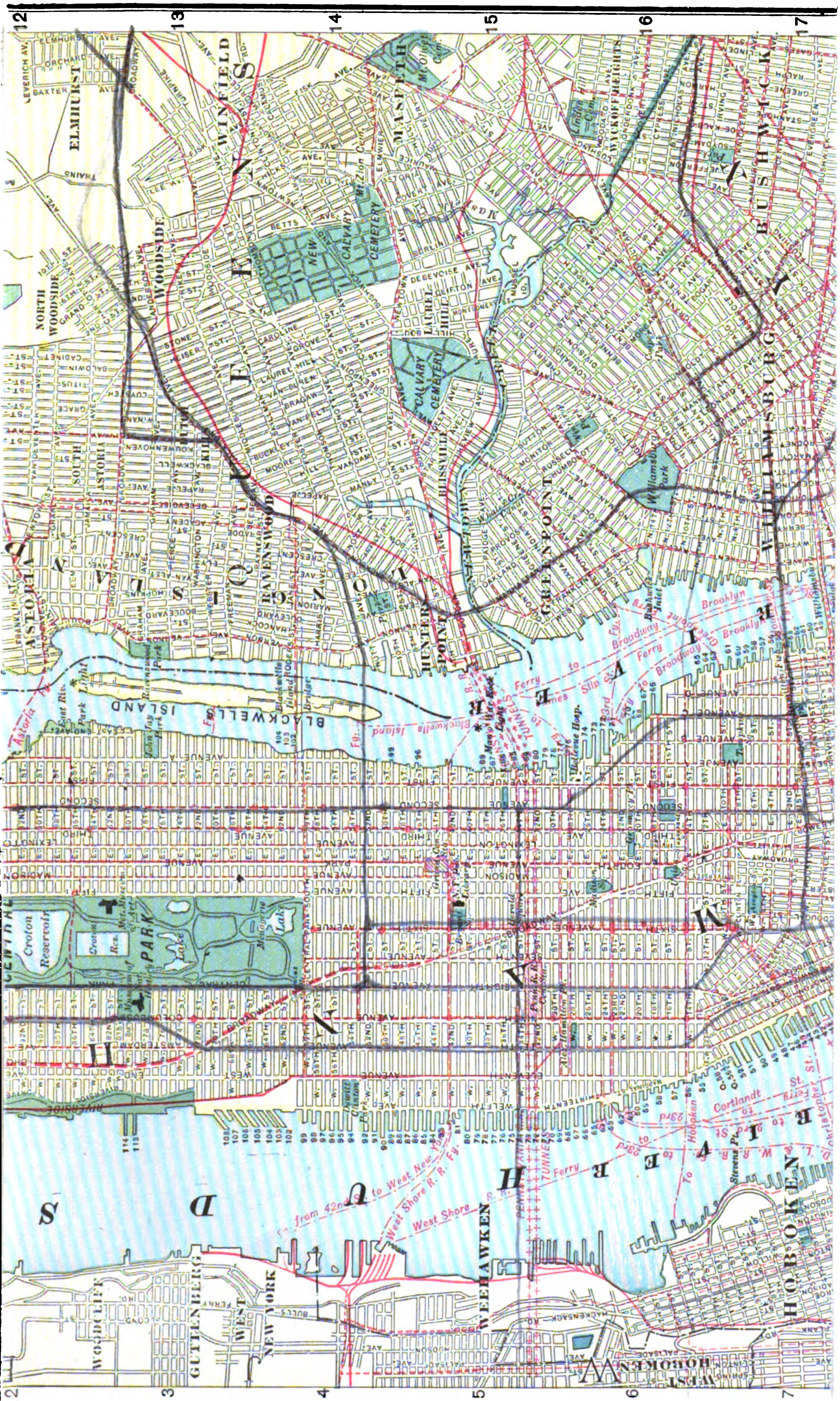
New York harbor, one of the finest in the world, has an entrance about a mile wide between Fort Hamilton, the southwest corner of the Borough of Brooklyn, and Fort Wadsworth, the point opposite on Staten Island. This entrance, known as the Narrows, leads into a fine bay bounded by New Jersey and Manhattan Island on the north, Long Island on the east, Staten Island on the southwest, and New Jersey on the west. It is about 5 miles wide and 6 miles long from north to south. The bronze statue, "Liberty Enlightening the World," by Bartholdi (see LIBERTY, STATUE OF), the largest statue of modern times, 151.41 feet in height, stands upon a pedestal 155 feet high on Bedloe Island in the bay. The torch held aloft by the figure is lighted at night by electricity. Governors Island, near the Battery, the southern point of Manhattan Island, containing 65 acres, is occupied by the United States government for military purposes. Ellis Island, a mile and a half from the Battery, architecturally prominent, with fine modern buildings, also belongs to the United States government and is used as a landing place for immigrants. On Swinburne and Hoffman islands, in the lower bay, are institutions of the quarantine station.

Previous to 1874 the city did not extend beyond Manhattan Island. At the beginning of that year parts of Westchester County were incorporated with it, and in 1895 more territory in Westchester County was annexed. In 1898 the city's boundaries were enlarged to include Kings County and part of Queens County, on Long Island, the whole of Richmond County (Staten Island), and part of the towns of East Chester and Pelham, south of Westchester County. The city, which embraces an area of 285 square miles, consists of five boroughs. These, in order of area, rank as follows: Queens (103 square miles), Brooklyn (72 square miles), Richmond (59 square miles), the Bronx (42 square miles), and Manhattan (20 square miles). The Borough of Manhattan (New York County) consists of Manhattan Island (q.v.) and several small islands adjacent. The Borough of Brooklyn is coextensive with Kings County. (See BROOKLYN.) All that section of the city northeast of the Harlem River, with a number of islands, constitutes the Borough of the Bronx (Bronx County). It is nearly bisected by the Bronx River and is mainly residential, its north portion having a distinctly suburban character, though much of the south part is closely built up. The Borough of Queens (Queens County) includes that portion of Long Island within the municipal limits to the north and east of Brooklyn. It comprises Long Island City, Flushing, Jamaica, Newtown, and part of Hempstead. A number of the islands in Jamaica Bay belong to the Borough of Queens. Long Island City is noted for its great industrial establishments. The remainder of the borough consists of many pretty suburban villages and not a few tracts of farm land. The Borough of Richmond is coextensive with Richmond County, the whole of Staten Island. It is largely a district of residences, although it contains a great number of establishments. The seaside resorts in the boroughs of Brooklyn, Queens, and Richmond are frequented in summer by thousands. New York extends over a distance of more than 30 miles from the Yonkers line on the northeast to the southwest extremity of Staten Island.

WALL STREET ABOUT 1765.

Manhattan Island (q.v.), which contains the chief offices of the city, its greatest banks, business houses, museums, tenements, and palaces, lies between the Hudson, East, and Harlem rivers and is 13½ miles long, with a greatest breadth of 2¼ miles at Fourteenth Street. There is an irregularity of streets at the south end of the island, extending to Houston Street on the east and Fourteenth Street on the west side. This was caused by the early colonists, who built settlements in widely separated parts of the island, streets being laid out from each settlement as they were needed, without regard to the city as a whole. As the city grew the streets lengthened, and those of the various sections, meeting at every conceivable angle, resulted in a tangle detrimental to the city's interests. In 1807 a commission was appointed to devise a city plan that should protect the interests of the entire community. The plan adopted disregarded the natural topography of the island, resulting in a city of straight lines and right angles, in blocks about 200 feet in length from north to south and from about 400 to about 900 feet from east to west. The cross streets are 60 feet wide, as a rule, although there are a number 100 feet wide, placed at an average distance of half a mile apart, in order to facilitate heavy traffic. The avenues running north and south are generally 100 feet wide.

The great artery of New York is Broadway, which unfortunately is only 80 feet wide in the business section of the city, its width being nearly doubled in its northern half. On the East Side of the city along the avenues D, C, B, A, First, Second, and Third, counting west from the East River, and in an adjoining area to the south, are the great tenement-house districts with their packed hordes and push-cart markets. On the West Side, along the Hudson and including the district between Seventh and Tenth avenues, are manufacturing plants, lumber yards, gas houses, and also many cheap tenements, mainly above Twenty-third Street. Below Twenty-third Street, extending south, are the great piers where the world's steamships lie, and behind and between them are the produce markets through which New York's food supplies pass. In the central part of the city, towards the south end of the island, with Broadway as the main artery, are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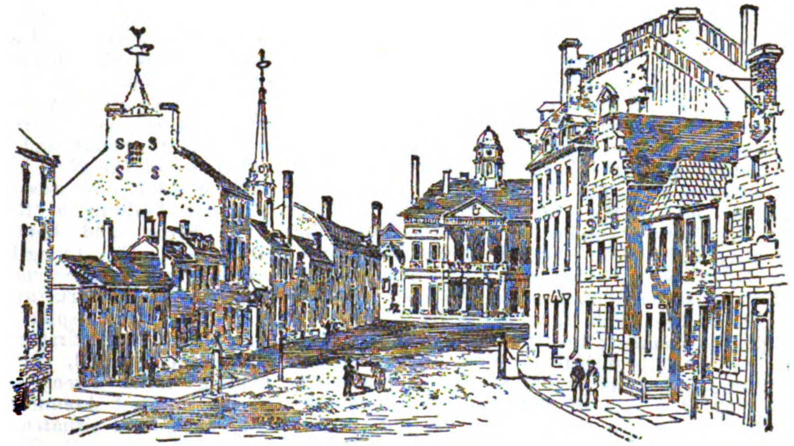
NORTH WOODSIDE
WOODSIDE
WINFIELD
MASPETH
ASTORIA
SOUTH ASTORIA
RAVENSWOOD
HUNTERS POINT
LAUREL HILL
BLISSVILLE
GREENPOINT
WILLIAMSBURG
BUSHWICK
WYCKOFF HEIGHTS
QUEENS
NEW CALVARY CEMETERY
CALVARY CEMETERY
Williamsburg Park
BLACKWELLS ISLAND
EAST RIVER
CENTRAL PARK
Croton Reservoir
MANHATTAN
HUDSON RIVER
WEEHAWKEN
WEST NEW YORK
GUTTENBERG
WOODCLIFF
WEST HOBOKEN
HOBOKEN
Pennsylvania R. R. Tunnels
West Shore R. R. Fy.
Fy. from 42nd St. to West New York

the largest banks and great commercial houses. Farther up is the retail shopping district, and above that are the homes of the well-to-do classes. Fifth Avenue, formerly occupied solely by the homes of rich people, is becoming more and more a business thoroughfare as far as Fifty-ninth Street, but above that street to about Ninety-sixth Street are churches, fine clubhouses, and the spacious homes of the rich. In 1865, when Central Park was approaching completion, the districts on both sides of the park east and west were entirely unimproved. Along Fifth Avenue, from Sixtieth Street to One Hundredth Street, there were not a dozen houses where to-day is a solidly built line of handsome dwellings. On the west side of the park the change has been still greater, but in addition to private dwellings there are hundreds of apartment houses. On Riverside Drive, the boulevard which skirts the Hudson River, there are both private residences and apartment houses. Riverside Drive, extending from Seventy-second Street to Spuyten Duyvil, is one of the most beautiful avenues in the world. Uptown along the West Side there are miles of small, artistic private houses until the neighborhood of 110th Street is reached, where over large areas apartment houses are again the rule. The upper part of the island along the East Side is solidly built up with tenement houses. A rocky ridge, rising steeply from the Hudson, with an equally abrupt descent towards the east, extends through the upper part of Manhattan Island, rising finally into hills of nearly 250 feet elevation. These eminences, in part known as Washington Heights, offer charming sites for dwellings and are in some places compactly built up, while extensive tracts are still covered with woods, presenting exquisite bits of scenery along the Hudson and Harlem rivers.



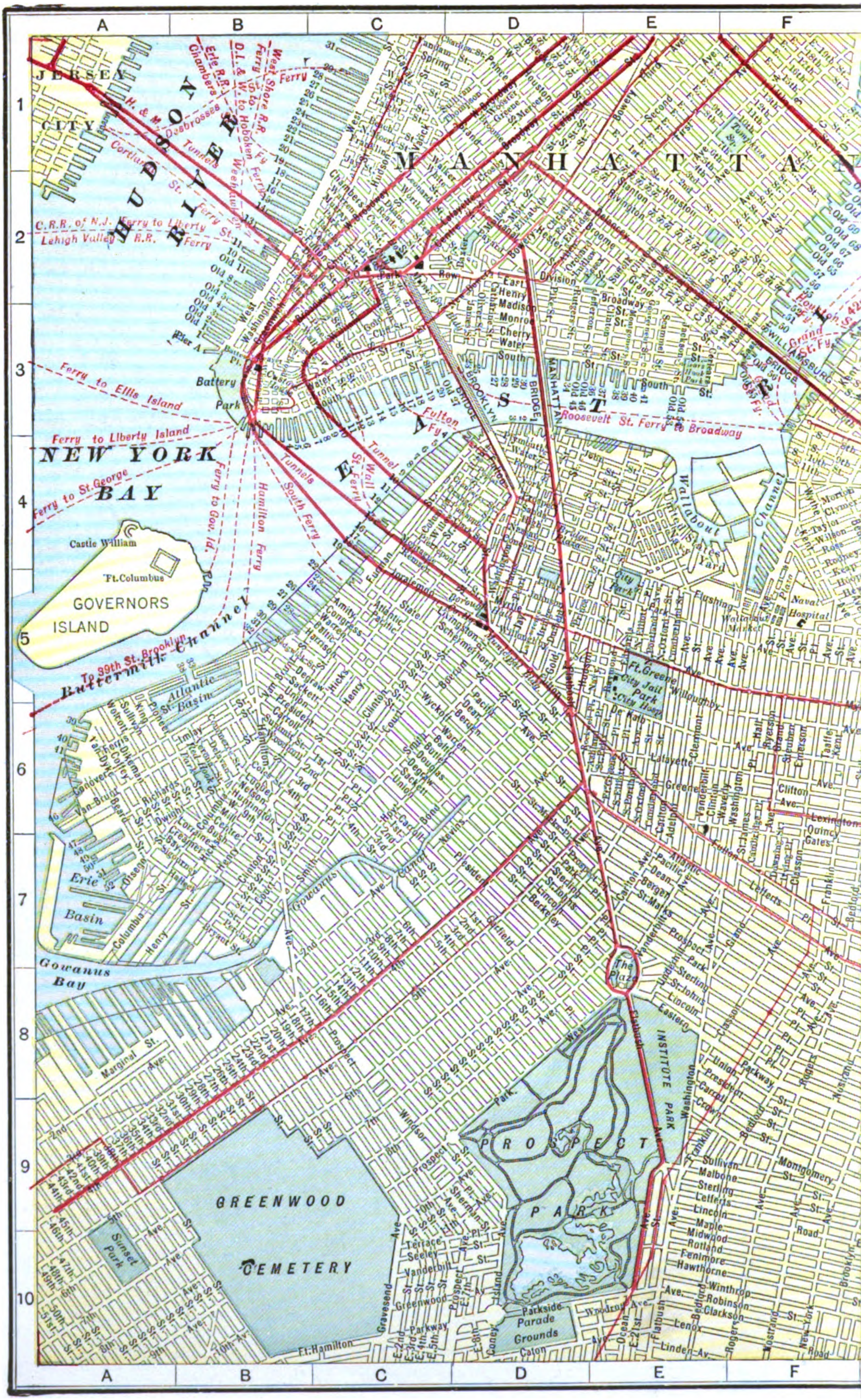
BROAD STREET IN 1796.

Blackwells, Wards, and Randalls islands, picturesquely situated in the East River, are used for city institutions for the care of the poor, sick, and disorderly. Contagious-disease hospitals are maintained by the city on the small islands off Port Morris, in the Borough of the Bronx.

Buildings. Viewed from the bay, the business part of the Borough of Manhattan presents a most extraordinary conglomeration of towering office buildings, huddled together in apparent confusion upon a strip of land less than a mile wide. Beginning at the Bowling Green, the most noted building is the new Custom House, standing on the site of Fort Amsterdam, the starting point of New York. To the west is the Whitehall Building, 31 stories in height, from the roof of which United States Weather Bureau observations are taken. From Bowling Green to City Hall, Broadway is lined with immense business structures, each of them costing millions of dollars, occupied by the Equitable Assurance Company, the Singer Sewing Machine Company, the Adams Express Company, the Manhattan Life Insurance Company, the Standard Oil Company, F. W. Woolworth & Co., and other large corporations. From Trinity Church, running east from Broadway to the river, is Wall Street, a narrow thoroughfare lined with buildings most of which tower from 12 to 39 stories above the pavement and are used by the great financial institutions. Chief among the buildings here is the Subtreasury, a Doric building of granite, upon the site of the old City Hall, and from the balcony of which Washington was inaugurated as first President of the United States. Across Nassau Street from the Subtreasury stands the 39-story Bankers Trust Building and on the opposite side the famous "Corner House," the new and palatial home of J. P. Morgan & Co. Next to the Subtreasury is the site of the United States Assay Office, once the projected home of the United States Bank. In Broad Street, which runs south from the Subtreasury, is the Stock Exchange, costing $2,000,000. Opposite is the Mills Building, erected about 1885 at a cost of $4,000,000. On the other side of Exchange Place is the Broad Exchange, a 20-story granite pile. Trinity Church, the most interesting of New York's churches, stands upon land granted by the English government in 1697. The original plot embraced a tract of many acres running down to the Hudson River. The first church was completed in 1697, the present one in 1846. It is a Gothic structure of brownstone. In the churchyard are many monuments in memory of well-known persons. On Broadway, from Trinity Church to the City Hall, are some of the most imposing of the insurance buildings. That of the Equitable Life Assurance Society occupies a whole block and is 37 stories in height. It replaced the old Equitable Building which stood upon the same site and was burned down in 1911. Here also is the building of the American Surety Company, with a cornice 307 feet above the pavement and a foundation extending 72 feet below the street. On the opposite side of Broadway the Singer Building towers 41 stories in air, its red shaft contrasting sharply with the white walls of the City Investing Building, 26 stories in height, which flanks it on two sides. In Cedar Street, a few doors from Broadway, is the Clearing House, a beautiful structure of white marble, maintained by the associated banks of New York. In Liberty Street is the home of the Chamber of Commerce. At 80 Maiden Lane stands a 25-story office building named for its street number. To the west of Broadway on Dey Street is the new 26-story building of the Western Union Telegraph Company, and farther west are the twin Hudson Terminal Buildings, from beneath which the Hudson and Manhattan Railroad Company's tubes run under the Hudson to Jersey City, Newark, and Hoboken. Farther over, facing the water front, is the beautiful 28-story West Street Building. At the junction of Broadway and Park Row stands the Post Office, a large and imposing composite structure of Doric and Renaissance, upon a triangular plot. Opposite the Post Office is St. Paul's Chapel, where Washington's pew is shown, and the St. Paul Building, 26 stories high, which at one time was considered one of the highest in the country. To the west, on Vesey Street, is the 32-story building of the *Evening Post*. On the corner of Broadway and Vesey formerly stood the old Astor House, torn down in 1914, a granite hotel which in the late sixties was considered the most luxurious establishment of its kind in the country. Across Broadway from the Post Office is the beautiful Woolworth Building, 55 stories, or 775 feet, in height, one of the highest structures in the world. North of the Post Office is the City Hall, in City Hall Park. Near by are the entrance to the Brooklyn Bridge, and the great buildings of the *World* and *Tribune* on the east. To the south is the Park Row Building, 25 stories high, not counting the towers. The City Hall is the most beautiful of New York's earlier buildings. It was begun in 1803 and finished in 1812 at a cost of $500,000. White marble was used for the front and sides, but brownstone for the back, as it was supposed that the city would not extend beyond it. Back of the City Hall is the County Court House, a marble building in Corinthian style, soon to be replaced by a new circular Court House of unique design, to be located near the intersection of Worth and Lafayette streets. Almost opposite, at the corner of Chambers and Centre streets, is the palatial Hall of Records. On the opposite side of Centre Street, with Chambers Street running through it, is the new Municipal Building, 24 stories in height, where a majority of the city departments are housed under one roof. The Criminal Courts Building, a superb structure on Centre Street, is connected with the Tombs Prison by a covered bridge. The Tombs, a nickname of the city prison, suggested by its original gloomy architecture in Egyptian style, rebuilt in 1898 and much enlarged, is now, architecturally, one of the finest of modern prisons.

Broadway, from Chambers Street to Tenth, is largely given up to wholesale trade, prominent features along the route, however, being the massive building of the New York Life Insurance Company and at Walker Street the 25-story Telephone Building, the largest in the world used exclusively for telephone-business purposes. West of Broadway, below Canal Street, lies the great wholesale dry-goods centre of the United States, and farther uptown are the wholesale dealers in straw goods, millinery, feathers, and ready-made clothing. Where Broadway changes its direction at Tenth Street, the character of business changes.

Here is Grace Church, one of the attractive ecclesiastical edifices of New York. It is an ornate Gothic structure, built of white limestone. There are other buildings connected with the church, the whole forming a striking group. In this neighborhood is the Mercantile Library, and at Fourth Avenue and Eighth Street is the Cooper Union (q.v.), a brownstone building erected in 1857. Union Square, once the limit of the retail business of the city and until 1860 surrounded by private houses, is now wholly given up to business. At the lower end of Fifth Avenue, in Washington Square, stands the Washington Arch, erected by popular subscription at a cost of $128,000 and completed in 1892. It is 70 feet high. On the east side of Washington Square is the large building of New York University, housing the schools of law, pedagogy, commerce, the graduate school, Washington Square College, and various business establishments. It occupies the site of the celebrated Gothic collegiate structure pulled down in 1894–95. In the district north by east of Union Square lies Gramercy Park, and, at Second Avenue, Stuyvesant Square, on which stands St. George's Church, with its lofty spires. At Eleventh Street and Second Avenue is the old home of the New York Historical Society, built in 1857, now used as a Newsboys' Home. The new building of the society, at Seventy-sixth Street and Central Park West, cost $1,000,000. The Lying-In Hospital at Second Avenue and East Seventeenth Street is one of the handsomest structures of its class in the city. Bellevue Hospital, founded in 1826, and where in 1869 the first ambulance service in the world was started, occupies three blocks extending from Twenty-sixth to Twenty-ninth Street on First Avenue to the East River; the City Morgue is situated in the grounds at the foot of Twenty-sixth Street. When the Herald Building, copied after a Venetian palace, was built at Thirty-fifth Street and Broadway in 1894, there were but few large retail stores in the neighborhood. To-day the vicinity of Broadway and Thirty-fourth Street is the centre of retail trade. One of the largest department stores in the country occupies the block on the west side of Broadway between Thirty-fourth and Thirty-fifth streets, while another extends along Sixth Avenue from Thirty-second to Thirty-third Street. The Hudson tubes enhance the importance of this locality. Beginning at Thirty-third Street, they run south under Sixth Avenue to Christopher Street and then under the river to Jersey City, Newark, and Hoboken. At Seventh Avenue and Thirty-second Street is the imposing Pennsylvania Railroad Station, beneath which tunnels extend east and west under the city and the East and Hudson rivers to Long Island and New Jersey. Along the line of Broadway, from Thirtieth to Fifty-ninth Street, are situated a number of important hotels, apartment houses, and the leading theatres of the city. At the angle of Broadway and Fifth Avenue, upon a triangle 87 by 190 feet, stands a 20-story wedge-shaped building known as the Flatiron. The graceful tower of the Madison Square Garden, copied from the Giralda of Seville, is surmounted by a gilded statue of Diana. On the east side of


A
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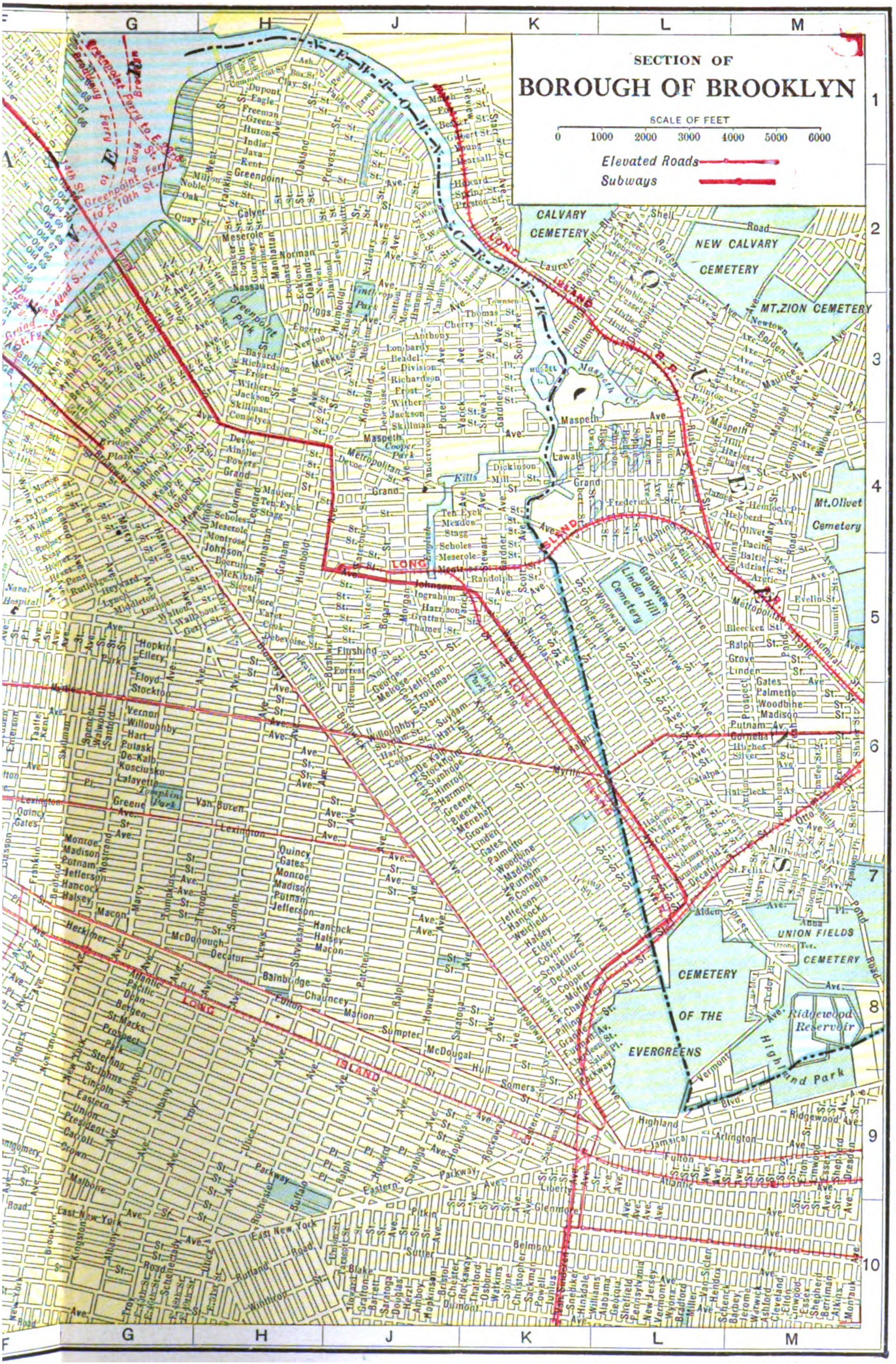
JERSEY CITY
HUDSON RIVER
MANHATTAN
EAST RIVER
NEW YORK BAY
GOVERNORS ISLAND
Castle William
Ft. Columbus
Buttermilk Channel
Battery Park
Ferry to Ellis Island
Ferry to Liberty Island
Ferry to St. George
Ferry to Gov. Id.
Hamilton Ferry
South Ferry
Wall St. Ferry
Fulton Fy.
Tunnels
Roosevelt St. Ferry to Broadway
C.R.R. of N.J. Ferry to Liberty St.
Lehigh Valley R.R. Ferry
Cortlandt St. Ferry
West Shore R.R. Ferry
D.L.& W. to Hoboken Ferry
Erie R.R. Chambers St. Fy.
H. & M. Tunnels
BROOKLYN BRIDGE
MANHATTAN BRIDGE
WILLIAMSBURG BRIDGE
Grand St. Fy.
Houston St. Fy.
Wallabout Channel
United States Navy Yard
Naval Hospital
City Park
Ft. Greene Park
City Jail
Atlantic St. Basin
Erie Basin
Gowanus Bay
The Plaza
PROSPECT PARK
INSTITUTE PARK
Parkside Parade Grounds
GREENWOOD CEMETERY
Sunset Park
To 39th St. Brooklyn


SECTION OF
BOROUGH OF BROOKLYN
SCALE OF FEET
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Elevated Roads
Subways
F G H J K L M
1 2 3 4 5 6 7 8 9 10
CALVARY CEMETERY
NEW CALVARY CEMETERY
MT. ZION CEMETERY
Mt. Olivet Cemetery
Linden Hill Cemetery
UNION FIELDS CEMETERY
CEMETERY OF THE EVERGREENS
Ridgewood Reservoir
Highland Park
Greenpoint Park
Winthrop Park
Cooper Park
Tompkins Park
Irving Sq.
Maspeth
Newtown Cr.
QUEENS
LONG ISLAND R.R.
Greenpoint Ferry to E. 23rd St.
Greenpoint Ferry to E. 10th St.
Broadway Ferry to 42nd St.
Naval Hospital
Grand St. Ferry
Myrtle
Fulton
Broadway
Flushing
Bushwick
Jamaica
Atlantic
Eastern Parkway
East New York
Metropolitan
Evergreen

Madison Square is the handsome office building of the Metropolitan Life Insurance Company, with its beautiful tower 50 stories high, visible for miles. Another beautiful and imposing marble building is the Court House at Twenty-fifth Street and Madison Avenue, used by the Appellate Division of the Supreme Court. The 28-story Times Building stands at Forty-second Street and Broadway.

St. Patrick's Cathedral (Roman Catholic) on Fifth Avenue, between Fiftieth and Fifty-first streets, ranks among the imposing Gothic edifices in America. It is built of white marble in the form of a Latin cross, and its two beautiful spires rise to a height of 332 feet. It cost $2,000,000. The corner stone was laid in 1858, and the church was dedicated with impressive ceremonies on May 25, 1879. At Forty-second Street and Fourth Avenue is the Grand Central Station, one of the largest and most beautiful structures of its kind in the country. Above Fifty-ninth Street, on Broadway, apartment hotels are the great feature of this thoroughfare. The first hotels of this character, in which the tenants furnish their own apartments, but take their meals in a common dining room, appeared in 1888. To-day there are more than 300 apartment hotels in Manhattan, each housing from 40 to 200 families.

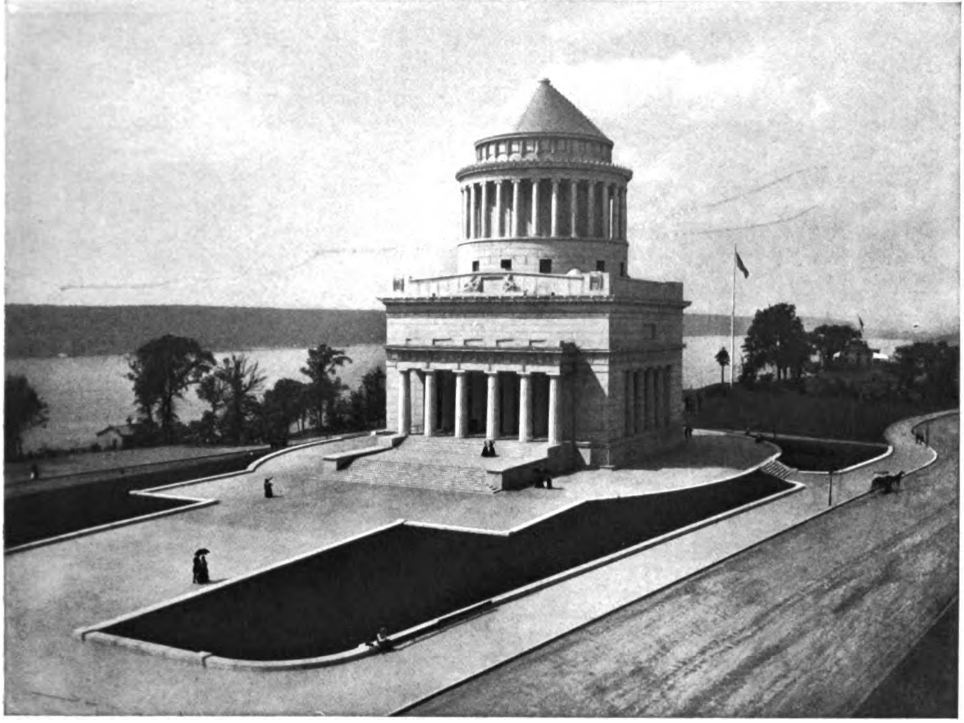
On an area inclosed by Amsterdam Avenue, Broadway, 114th and 122d streets, and on two adjacent plots, one of which extends from 116th to 120th Street, just west of Broadway, and the other east of Amsterdam Avenue, between 116th and 117th streets, are the buildings of Columbia University, including a magnificent library costing about $1,000,000. Near by are St. Luke's Hospital and the beginnings of the great Protestant Episcopal cathedral of St. John the Divine. The building stands upon a rocky bluff overlooking the Harlem plains on the east. Various estimates of from 30 to 50 years as the time required to finish the building have been made, and the cost may be anywhere from $10,000,000 to $20,000,000. In vastness of dimensions and beauty of design it will take its place among the great cathedrals of the world. On Amsterdam Avenue, between 109th and 110th streets, is the building of the National Academy of Design, the well-known Venetian-Gothic building, formerly occupied by the Academy, at the corner of Twenty-third Street and Fourth Avenue, having been demolished in 1901. Facing Central Park on the north side of Seventy-seventh Street is the American Museum of Natural History, the second museum in importance in the United States. On the east side of the park and within it, facing on Fifth Avenue at Eighty-second Street, is the Metropolitan Museum of Art. The beautiful mansion of Henry C. Frick, fronting Central Park between Seventieth and Seventy-first streets, is on the site formerly occupied by the Lenox Library building, which was torn down when that collection was moved to the great building at Forty-second Street and Fifth Avenue. Farther up Fifth Avenue, at One Hundredth Street, is Mount Sinai Hospital, one of the largest and most perfectly appointed in the country. At 123d Street and Riverside Drive is the tomb of General Grant, a mausoleum in classic style, covering an area about 100 feet square and rising 160 feet from the ground. It stands upon a bluff overlooking the Hudson. The corner stone was laid in 1892, and the building was dedicated on April 27, 1897. The bodies of General Grant and his wife lie in twin granite sarcophagi in the crypt under the dome. On Convent Avenue at 138th Street are the handsome buildings of the College of the City of New York, and just south the Stadium (given by Adolph Lewisohn) of reënforced concrete which seats 6000. The structure covers two blocks, and cost $200,000. The fine Indiana sandstone building of the Hispanic Society of America stands at 156th Street and Broadway. It has the best library on Hispania in America. Farther north, in the Borough of the Bronx, are the beautiful library and other buildings of New York University.

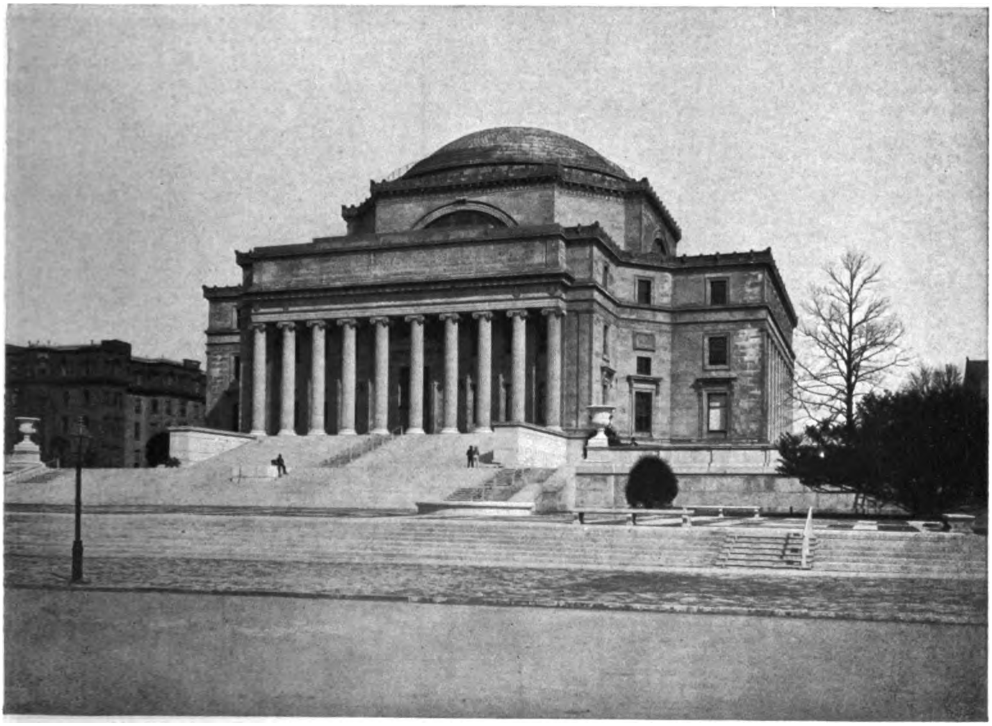
Parks and Monuments. The first park space was Bowling Green; the next, the space now called City Hall Park, which, when the English ruled New York, was a common ground where cattle grazed. Washington Square now covers ground once a paupers' graveyard, and Madison Square and Bryant Park had the same origin. There are three chief periods of development in city parks, the first marked by the creation of Central Park in 1853, the second with the laying out of Riverside Park in 1872, and the third by the commencement of the work of creating small parks in 1887. The first suggestion of Central Park came in 1850, when Mayor Ambrose C. Kingsland, taking the suggestion of a citizen, sent a special message to the common council advocating a public park. In 1851 a committee selected a plot called Jones's Woods, above Sixty-sixth Street on the East Side. This plot was later rejected for one more central, and in 1853 the Legislature passed an Act giving authority for the acquisition of the present Central Park. Work was begun in 1857. Central Park is now one of the most beautiful pleasure grounds in the world. It contains 840 acres. About 400 acres are wooded, this area including specimens of nearly every tree and shrub that can be made to grow here. There are 9 miles of drives, with 37 miles of footpaths and other roads; many bridges, archways, and tunnels; several lakes; a large reservoir a mile and a half in circuit; an imposing mall, lined with superb trees; and a large number of statues. Zoölogical and botanical gardens are also among its attractions. On fine days in summer 100,000 persons often visit the park. Lawns are provided for free tennis courts, and there is a field for baseball and other games. One of the chief curiosities of Central Park is the Obelisk (see CLEOPATRA'S NEEDLES; OBELISK), presented to the city by the late Khedive of Egypt, Ismail Pasha, which was brought here in 1880.

In Central Park are a bronze statue of Burns, presented by resident Scotchmen; a granite statue of Alexander Hamilton; a life-size bronze statue of Morse, erected in 1871 by the telegraphers of the country; a bronze statue of Sir Walter Scott by John Steele; a bronze statue of Shakespeare by J. Q. A. Ward, unveiled on May 23, 1872, commemorating the poet's birth over 300 years previous; a bronze statue called "The Pilgrim," by Ward, commemorating the landing of the Pilgrims in 1620; an heroic bronze statue of Daniel Webster by Thomas Ball; the famous "Indian Hunter," in the Mall; the bronze "Civil War Soldier," on the West Drive; and busts of Beethoven, Cervantes, Humboldt, Schiller, and Thomas Moore. Near the entrance to the park at Fifty-ninth Street and Eighth Avenue, in the centre of Columbus Circle, stands a marble monument to Columbus, a shaft surmounted by a statue, which was unveiled in 1892. Opposite, forming the park entrance, the Maine Memorial is placed. At the Sixth Avenue and Fifty-ninth Street entrance is a bronze statue of Thorvaldsen, erected in 1894 by the Danes of New York. On the Plaza at Fifth Avenue and Fifty-ninth Street is an imposing equestrian statue of General Sherman by Augustus Saint-Gaudens. Directly opposite, the Pulitzer fountain is (1915) in course of construction. Opposite Seventieth Street and Fifth Avenue is a memorial to Richard M. Hunt, the architect, consisting of a semicircular bench with a bronze bust of Hunt, by French, and ornamental figures. The most notable statues in other parts of the city are the bronze figure of Peter Cooper, by Saint-Gaudens, south of the Cooper Union; the bronze statue of John Ericsson, by J. Scott Hartley, at the Battery; the statue of Farragut, by Saint-Gaudens, in Madison Square Park; the bronze statue of Garibaldi, by Turini, in Washington Square, presented to the city by the Italian residents; the colossal bronze statue of Horace Greeley, by Alexander Doyle, in Greeley Square; the bronze statue of Lafayette, by Bartholdi, in Union Square, presented by French residents in 1876; the bronze statue of Abraham Lincoln, modeled by H. K. Browne, in Union Square, erected by popular subscription in 1867; the equestrian statue of Washington, also by Browne, in Union Square; the beautiful statue of William Cullen Bryant unveiled in Bryant Park; the bronze equestrian statue of General Franz Sigel overlooking the river at 106th Street and Riverside Drive, unveiled in October, 1907; at Broadway and West End Avenue the Straus Monument, commemorative of the *Titanic* dead; the imposing bronze figure of Carl Schurz at Morningside Drive and 116th Street; the famous Nathan Hale statue in City Hall Park; and the colossal bronze figure of Washington, by J. Q. A. Ward, at the entrance of the Subtreasury in Wall Street. There are also throughout the city various other statues of interest, among them those of Chester A. Arthur and Roscoe Conkling, in Madison Square; Abraham De Peyster, in Bowling Green; William E. Dodge, at Broadway and Thirty-sixth Street; Benjamin Franklin, in Printing House Square; Alexander Holley, in Washington Square; Dr. Marion Sims, in Bryant Park; and Peter Stuyvesant, in St. Mark's Church. The Soldiers and Sailors Monument, on Riverside Drive, and the Water Gate, at West 110th Street, marking a landing place of Henry Hudson, are also of more than usual interest, as well as that at Bowling Green to the memory of heroic wireless operators.

The most important park of the city after Central Park is Brooklyn's pleasure ground, Prospect Park. (For description, see BROOKLYN.) The third in interest is Bronx Park, which includes an area of 719 acres on both sides of the Bronx River. It has superb botanical and zoölogical gardens, opened to the public in 1899. Van Cortlandt Park, north of Kingsbridge, is even larger in extent (1132 acres). The old Van Cortlandt mansion here, erected in 1784, now serves as an historical museum. The collection became so large that a wing had to be added to the building. There are golf links, grounds for baseball, tennis, and polo, and a lake frequented in winter by thousands of skaters. Pelham Bay Park, on the Sound, near Baychester, is the largest of the New York City parks, containing 1756 acres, with fine golf links, baseball grounds, bathing beaches, and a vast camping tract where city dwellers may pitch tents. It is diversified by lakes and islands and has a shore line of 9 miles. These three suburban parks, the Bronx, Van Cortlandt, and Pelham, are connected by a driveway, maintained by the park department. On Manhattan Island millions of dollars have been spent in reclaiming and beautifying the strip of land along the edge of the Hudson River from Seventy-second Street to Spuyten Duyvil, known as Riverside Drive and Park, and since 1901 a handsome viaduct and driveway across Manhattan valley connects the southern part of the park with the northern heights. Morningside Park, on and under the cliffs at Columbus Avenue, between 110th and 123d streets, has also been laid out with excellent taste. The Harlem River Speedway, extending for 2 miles along the western bank of the river, from 155th to 208th Street, was completed in 1898. Close by the start of the Speedway, at 155th Street, are the old Polo Grounds, where in the season daily multitudes attend to see baseball games. In the fall of those years that World's Championship games are played in New York, the stands are filled to their capacity of 40,000 and as many turned away. Above Manhattan Island are Crotona and Claremont parks, in the vicinity of Tremont, and St. Mary's Park (28 acres) at 149th Street. There are many squares and small parks throughout the city. The playgrounds and recreation piers, of which there are several, should be mentioned in connection with this phase of municipal activity. The New York Zoölogical Society has a well-stocked aquarium (q.v.) in the old Castle Garden at Battery Park.

Churches. There are over 800 churches in Manhattan and the Bronx, ranging in seating capacity from 200 to 2000. The Dutch Reformed church (32 societies) has the oldest church organization in New York. The finest of its churches is the St. Nicholas, at Fifth Avenue and Forty-eighth Street, which owes its ample endowment to fortunate real-estate investments. Other handsome buildings of this denomination are the Bloomingdale Church, at Broadway and Sixty-eighth Street, and the Marble Church, at Fifth Avenue and Twenty-ninth Street. Next in order of foundation is the Episcopal church (91 churches). Something has already been said of the parent church, Trinity, of the new cathedral of St. John the Divine, and of Grace Church. This denomination possesses a number of notable buildings, several of which are chapels of Trinity, built and supported out of its endowment. St. George's, the Transfiguration (in Twenty-ninth Street near Madison Avenue), popularly known as the Little Church Around the Corner, and St. Thomas's are fine examples of ecclesiastical architecture. St. Bartholomew's, at Forty-fourth Street and Madison Avenue, with its remarkable bronze doors placed in memory of Cornelius Vanderbilt by his widow, is soon to be torn down, when the new church of Romanesque design is completed on the east side of Park Avenue at Fiftieth Street. The most noted Presbyterian church (71 churches) is





NEW YORK

THE TOMB OF GEN. U. S. GRANT (UPPER)

THE LIBRARY OF COLUMBIA UNIVERSITY (LOWER)

that known as the Fifth Avenue, at Fifty-fifth Street. The Madison Square Church and the Brick Church, at Fifth Avenue and Thirty-seventh Street, are among the strongest organizations of the denomination. The John Street Methodist Episcopal Church (62 Methodist Episcopal churches) occupies the site of the first of this denomination in America and is known as the cradle of American Methodism. The most noted Baptist church (49 churches) is that at Fifth Avenue and Forty-sixth Street. Among the Congregational churches is the Broadway Tabernacle. The old church which stood at Broadway and Thirty-fourth Street was sold, and a new one, built at Broadway and Fifty-sixth Street, was opened in 1905. All Souls', at Fourth Avenue and Twentieth Street, is the oldest of the Unitarian churches, while the Divine Paternity, at Central Park West and Seventy-sixth Street, holds a similar position among the Universalist churches. There are 114 parishes of the Roman Catholic faith, the cathedral of St. Patrick, at Fifth Avenue and Fiftieth Street, being one of the finest church buildings of the city. The oldest of its churches is St. Peter's, in Barclay Street, which stands upon the site of a chapel built in 1786. The first Jewish synagogue of the city was the Shearith Israel, founded about 1675 and now possessing a beautiful temple at Central Park West and Seventieth Street. The Temple Emanu-El, at Fifth Avenue and Forty-third Street, the Beth-El, at Fifth Avenue and Seventy-sixth Street, and the Temple Israel, in Harlem, are all fine buildings. Also noteworthy are the edifices of the First Church of Christ (Scientist), Central Park West and Ninety-sixth Street, and of the Second Church, Central Park West and Sixty-eighth Street. The Young Men's Christian Association, which for 30 years had its headquarters at Fourth Avenue and Twenty-third Street, now has them in its house on the same street, west of Seventh Avenue. The Young Women's Christian Association has a beautiful home at 7 East Fifteenth Street.

Educational Institutions. The number of schools within the jurisdiction of the city, omitting the Nautical School, which has recently been transferred to the jurisdiction of the State, is close to 600. Of corporate schools, orphan asylums, and industrial schools there are above 50, with an average attendance of some 18,000. The College of the City of New York (q.v.), formerly located at Lexington Avenue and Twenty-third Street, was established in 1847 under the name of the New York Free Academy. It now occupies handsome buildings, costing $4,000,000, at 138th Street and Convent Avenue. Hunter College, formerly known as Normal College, occupies the block north of Sixty-eighth Street between Park and Lexington avenues. It has a total attendance of over 3000, including a full elementary school and high school. There is also a State normal school at Jamaica, in the Borough of Queens. An important work of the department of education is the lecture system, under which free evening lectures are given in a number of places from October to May. The board of education also provides free night schools. The most important of the private educational institutions is Columbia University (q.v.), on Morningside Heights. Barnard College (q.v.), for women, and the Teachers College, for both sexes, are affiliated with the university. The College of Physicians and Surgeons (the medical department of the university) occupies extensive buildings on Sixtieth Street, near Roosevelt Hospital. Barnard College and the Teachers College, with which is incorporated the Horace Mann School, also have suitable buildings of their own on Morningside Heights. New York University (q.v.) maintains professional departments in the Borough of Manhattan and undergraduate and engineering schools at University Heights, in the Borough of the Bronx. Its main site, in the Bronx, on the heights overlooking the Harlem, is one of singular beauty. Here is the Hall of Fame (q.v.). The Union Theological Seminary, which has academic relations with New York and Columbia universities, is at Broadway and 120th Street. It is one of the chief training schools for ministers of the Presbyterian church. The Protestant Episcopal church maintains its General Theological Seminary in a group of beautiful buildings, modeled after the Oxford college type, at Ninth Avenue and Twentieth Street. The new building of the Jewish Theological Seminary of America, on 123d Street, between Amsterdam Avenue and Broadway, was dedicated in 1903. Further west, on Claremont Avenue, is the new building of the Institute of Musical Art. Cooper Union occupies a prominent place among the educational institutions of the city. Its classes, with very few exceptions, are entirely free. The attendance is large. St. John's College, at Fordham, in the Borough of the Bronx, the College of St. Francis Xavier, and Manhattan College are important institutions under control of the Roman Catholic church. Cornell University (q.v.) maintains part of its medical department in New York City. Among independent professional institutions are the New York Law School; the New York Homeopathic Medical College and Hospital, the New York Medical College and Hospital for Women, and the Eclectic Medical College; the New York College of Dentistry and the New York Dental School; and the College of Pharmacy of the City of New York.

Libraries and Museums. For many years the Astor Library, founded under the will of John Jacob Astor, who died in 1848, leaving $400,000 for the purpose, was the only free library of importance in the city. The Mercantile Library, which was founded in 1820, is a subscription library with more than 230,000 volumes. The Astor Library, formerly in Lafayette Place, was entirely for reference and was visited by about 159,000 readers every year. The Lenox Library (reference), formerly at Fifth Avenue and Seventieth Street, the gift of the late James Lenox, was opened to visitors in 1877. In 1895 the Astor and Lenox libraries and the Tilden Trust Fund were consolidated as the New York Public Library (q.v.). The number of volumes is now over 2,090,000 in the central and branch libraries combined. The new building for the Public Library, a vast structure of white marble, 366 feet long and 246 feet wide, is upon the site of the old reservoir at Fifth Avenue, between Fortieth and Forty-second streets. Its estimated cost is about $5,000,000. It has shelving capacity for 1,250,000 volumes. The first circulating library dates from 1880. The New York Public Library, the New York Free Circulating Library, and other libraries were consolidated in 1901. In the same year Andrew Carnegie offered the city $5,200,000 for the purpose of building branch libraries on condition that the city furnish sites. There are now 40 branch libraries. The first one was opened in December, 1902. The library of Columbia University contains about 500,000 volumes, of which 10,000 are in the reference room open to the public. The Cooper Union Library contains about 52,000 volumes, the chief feature of which is a complete set of Patent Office reports. Among the private libraries of importance are those of the Historical Society, the Geographical Society, the Hispanic Society of America, and the New York Society Library. The last, founded in 1754, has about 75,000 volumes. There are also special collections of books belonging to the American Society of Civil Engineers, the New York Academy of Medicine, with 90,000 volumes, and the New York Law Institute, with 78,000.

The Metropolitan Museum of Art, the most important in this country, which occupies a superb series of buildings on the east side of Central Park, is the outcome of a public meeting held in 1869. (See METROPOLITAN MUSEUM OF ART.) The American Museum of Natural History, on Central Park West, contains large collections of stuffed animals, birds, reptiles, fishes, shells, and fossils. The main lecture hall will seat 1000 persons. A museum of great interest is maintained also by the Historical Society, while the New York Public Library has a fine picture gallery.

Theatres, Clubs, Hotels. New York has over 50 theatres, in addition to almost as many vaudeville houses and concert halls. Besides these there are several hundred moving-picture places that have been either especially built or converted from stores. The largest house of amusement is the Hippodrome, at Sixth Avenue from Fourty-fourth to Forty-fifth streets, with a seating capacity of 5200. The Metropolitan Opera House is the most famous and occupies the block bounded by Broadway, Seventh Avenue, Thirty-ninth and Fortieth streets. Among the largest and most luxurious theatres, most of which are on or near Broadway, are the Astor, at Forty-fifth Street; Belasco, in Forty-fourth Street; the Booth, in Forty-fifth Street; the Century, at Sixty-second Street and Central Park West; the Cort, in Forty-eighth Street; the Empire, at Fortieth Street; the Globe, at Forty-sixth Street; the Hudson, in Forty-fourth Street; the Knickerbocker, at Thirty-eighth Street; and the New Amsterdam, in Forty-second Street. In other parts of the city should be mentioned the Irving Place Theatre, a German high-class theatre, at Fifteenth Street and Irving Place; the old Grand Opera House, West Twenty-third Street; and the Manhattan Opera House, in West Thirty-fourth Street, now not used for opera. A recent experiment in theatre building has been the construction of a number of small theatres, called intimate houses, designed to seat audiences of only a few hundred. Some notable examples of this class are the Little Theatre, in Forty-fourth Street; the Punch and Judy, in Forty-ninth Street; the Bramhall, in Twenty-seventh Street; and the Bandbox, in East Fifty-seventh Street. Of houses designed especially for moving pictures, most important are the Strand, at Broadway and Forty-seventh Street, and the Rialto, which occupies the corner at Forty-second Street and Broadway, where for many years stood Oscar Hammerstein's Victoria. The most important music hall of the city is that built by Andrew Carnegie, at Fifty-seventh Street and Seventh Avenue, which is known by its founder's name. It was opened in May, 1891. It is one of the finest concert halls in the world and cost more than $1,000,000. The main hall seats 3000 people, and there are two smaller concert rooms. The most important instrumental and choral concerts of the season, such as those of the Philharmonic Society, the Boston Orchestra, and the Oratorio Society, are given here. Æolian Hall in Forty-second Street is used for solo recitals, etc. The total seating capacity of New York's houses of amusement has been estimated at over 200,000. The Harlem section also has several fine theatres, among which are the Harlem Opera House, near Seventh Avenue on 125th Street, and the West End Theatre, on 125th Street west of Manhattan Avenue. The Star Theatre, at Lexington Avenue and 107th Street, is also a large house.

The clubs of New York number more than 200. The oldest and most conservative of the non-political clubs is the Union, at Fifth Avenue and Fifty-first Street, organized in 1836. The Union League Club, at Thirty-ninth Street and Fifth Avenue, is the largest political club. The most important club of artists and literary men is the Century Association, organized in 1847, which possesses a beautiful building in West Forty-third Street. Among other noted clubs may be mentioned the Army and Navy, Catholic, City, Calumet, Colonial, Elks, Grolier, Knickerbocker, Lambs, Lawyers, Lotos, Metropolitan, New York, Players, Progress, Reform, University, and the New York Athletic, which has the largest membership of all New York clubs. The Players Club, as its name implies, has a membership largely composed of theatrical people. Its beautiful home on Gramercy Park, costing $250,000, was presented to the club by the distinguished tragedian Edwin Booth. The University Club membership is restricted to graduates of colleges. Its clubhouse, an imposing structure of granite, opened in May, 1899, at Fifth Avenue and Fifty-fourth Street, is one of the finest in the city. The New York Yacht Club also has a magnificent clubhouse on West Forty-fourth Street. One of the newest clubs is the Aëro Club of America, housed at 297 Madison Avenue and formed to promote aëronautics.

New York has about 60 hotels that may be ranked as first class, with as many more in the second class, and perhaps 150 of a lower grade. One of the best known is the Waldorf-Astoria. It is built upon the site of the family mansions in which lived for many years John Jacob Astor and William Astor, his brother. This structure covers the block between Thirty-third and Thirty-fourth streets, bordering Fifth Avenue. The Buckingham, at Fifth Avenue and Fiftieth Street; the Claridge, at Forty-fourth Street and Broadway; the Biltmore, at Madison Avenue and Forty-third Street; the Vanderbilt, at Park Avenue and Thirty-fourth Street; the Ritz Carlton, at Madison Avenue and Forty-sixth Street; the Astor, at Broadway and Forty-fourth Street; the Belmont, at Fourth Avenue and Forty-second Street; the St. Regis, at Fifth Avenue and Fifty-fifth Street; the Gotham, at Fifth Avenue and Fifty-fourth Street; the Murray Hill, at Park Avenue and Forty-first Street; the Manhattan, at Madison Avenue and Forty-second Street; the Netherland and the Savoy, at Fifth Avenue and Fifty-ninth Street, are large and luxurious hostelries, which accommodate from 800 to 2000 guests. Farther down town a number of the Broadway hotels, such as the Imperial, at Thirty-second Street, and the McAlpin, at Thirty-fourth Street, are equally popular. Several immense hotels, among which may be mentioned the Plaza, at Fifty-ninth Street and Fifth Avenue, and the Majestic, at Seventy-second Street and Central Park West, are known as family hotels of the best type. The Martha Washington, in Twenty-ninth Street, is exclusively for women. The most luxurious restaurants in the city are Delmonico's, at Forty-fourth Street and Fifth Avenue, and Sherry's, almost opposite.

Charities. The great number of immigrants landing at the port of New York, the poorest of whom remain in the city, tends to increase the dependent class. The administration of public charities is under a separate department governed by a commissioner, who appoints three deputies and other subordinate officers. New York City differs from some of the other large American cities in that it grants large subsidies to private charitable institutions, the amount spent in this way exceeding that apportioned to public charities. In 1915 the city maintained three homes, with 5625 inmates, and 11 hospitals; 1 for feeble-minded, 1 for tuberculosis, 1 for convalescent mothers and children, 8 for general diseases—total beds, 17,988. Nearly all of the city institutions and some of the State and private institutions are located on Randalls, Wards, and Blackwells islands, in the East River. Sailors Snug Harbor, a home for aged seamen, is on Staten Island. This institution derives an income of $250,000 from valuable Broadway real estate, with which it is endowed. The orphan asylums of New York are under private control. Private charity is active and thoroughly organized, and much has been done to correlate the different agencies by the Charity Organization Society of New York City. The society has a number of subcommittees in charge of the different districts into which the city is divided. The Brooklyn Bureau of Charities performs a similar function in that borough. Among the more important organizations which give attention to charitable work are the United Hebrew Charities, Children's Aid Society, St. Vincent de Paul Society, and the Association for Improving the Condition of the Poor. The conditions in the crowded sections of the city have been greatly improved by the work of social settlements and similar institutions, of which there are a large number, some denominational, others nonsectarian. Manhattan alone has 39 social settlements, Brooklyn 9, Bronx 3, and Queens 1.

Intercommunication. The problem of passenger transportation within the limits of New York City and its residential areas offers peculiar difficulties. The wholesale business is at the lower end of Manhattan Island and the shopping districts in the middle, while the dwelling districts are at the upper end and across the waterways in the surrounding regions. The crowding and discomfort on the various car and ferry lines during the rush hours surpass anything of the kind known in any other city of the world. There are car lines on almost all the thoroughfares leading north from the business district, the limit of surface transportation in this direction having been practically reached. The first elevated railroad was opened on Ninth Avenue in 1870, from the Battery to Fifty-ninth Street. The Sixth Avenue line, opened in 1878, extended from the Battery to the Harlem River, the upper half being on the line of Ninth and Eighth avenues. Similar lines were built on Third and Second avenues to the Harlem River, and later the Third Avenue line was carried across the Harlem River into the northern suburban districts. The elevated roads, on which it was found practicable to run trains by steam at a high rate of speed and at very short intervals, with a minimum of danger, soon proved utterly inadequate for the traffic. In 1886 the first cable line in Manhattan was established on 125th Street. In 1898 the underground electric trolley system was introduced and rapidly supplanted the cable all over Manhattan. The overhead trolley system still prevails in other portions of Greater New York. In 1902 the elevated roads began to run their trains by electricity. A contract was awarded in January, 1900, by a commission created for the purpose, for an underground rapid-transit railway system running from one end of Manhattan to the other, with a branch, starting at 104th Street, to the Bronx. Work upon the subway was begun in March of that year, and the road was opened for use on Oct. 24, 1904. The total cost of construction was $40,000,000. The contractors are conceded the right to operate the road for 50 years. Forty-three stations are provided on the main line running the length of Manhattan, four on the Brooklyn side, and 15 on the Bronx branch. The extension of the subway to Brooklyn was decided on in May, 1901, and finished shortly after the Manhattan end. It runs under the East River and along Joralemon and Fulton streets to Atlantic Avenue. In 1913 the city entered into contracts with the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company for the construction and operation of new rapid-transit lines known as the Dual System. The new contracts call for the construction of 44.55 miles of new subway and 53.19 miles of new elevated road in every borough except Richmond. The proposed tunnel from Brooklyn to Staten Island, while provided for in the Dual System, is left for future construction. The present subway is like a vast Y with a bent stem. When the new lines are finished, the Manhattan part will look like a huge H with frayed ends and crossed by several lines winding into Brooklyn and spreading out like the spokes of a fan. There is a very extensive ferry system between Manhattan and the surrounding region. Besides the ferries to Brooklyn (q.v.) and Long Island City, lines connect with Jersey City, Hoboken, Weehawken, Fort Lee, Staten Island, and other points. During the winter months the ferry traffic is somewhat impeded by occasional fogs and floating ice. The construction of the Brooklyn Bridge (see BRIDGE) in 1883 greatly facilitated communication with Brooklyn, but in later years the bridge has been wholly inadequate. A second bridge, known as the Williamsburg Bridge, was begun in 1896 and opened in 1903, extending from Delancey Street, Manhattan, to Broadway, Brooklyn. The Queensboro Bridge, opened to traffic in 1909, extends from Fifty-ninth Street, Manhattan, to Long Island City by way of

Blackwells Island. It is a continuous cantilever, and its total length with approaches is 7449 feet. The Manhattan Bridge, which extends from Canal Street, Manhattan, to Nassau Street, Brooklyn, was not entirely completed until 1911, although begun in 1901. In addition to these bridges the immense Wards Island Bridge, in process of construction in 1915, is to span Hell Gate, carrying railroad tracks from the mainland into Queensborough and thence by the Long Island and Pennsylvania Railroad tubes through Manhattan into New Jersey, opening thus an all-rail line through New York City from all points south and west to north and east. The Harlem River is spanned by a number of costly bridges, Washington Bridge being perhaps the finest structure of its kind in the country, and High Bridge, which carries the old Croton Aqueduct at an elevation of over 100 feet, being unequaled among American stone bridges.

Newspapers. The total number of newspapers published in Manhattan and the Bronx in 1915 was 981. The oldest of the daily newspapers are the *Commercial Advertiser*, founded in 1797, and the *Evening Post*, founded in 1801, of which William Cullen Bryant was for nearly 50 years the editor. The *Sun*, founded in 1833; the *Herald*, founded in 1835 by James Gordon Bennett; the *Tribune*, founded in 1841 by Horace Greeley; the *Times*, founded in 1851 by Henry J. Raymond; the *World* (1861), the *American*, the *Press*, and the *Staats-Zeitung* are the most important of the morning newspapers. The *Evening Post*, the *Globe and Commercial Advertiser*, the *Mail*, the *Telegram*, the *Evening Sun*, the *Evening World*, and *Evening Journal* are the chief afternoon publications. See NEWSPAPER.

Commerce and Industry. New York did not rise to commercial preëminence until the beginning of the nineteenth century. Its rise is due to its central location on the Atlantic seaboard, and especially to its excellent harbor, which lies at the entrance to the fine natural waterway, the Hudson River and the Mohawk valley, leading to the highly productive north-central portion of the United States. The opening of the Erie Canal in 1825 was the most important event in the business history of the city. New York was already far in advance of its rivals before the building of railroads began, a fact which tended to make it a great focal point in their construction. It is difficult to overemphasize the importance of New York as an entrepôt of trade. It is without a rival as the centre of the wholesale dry-goods and wholesale grocery business. Not only does it market its own manufactures and the greater part of its imports, but the trade in many varieties of domestic goods from outside centres here.

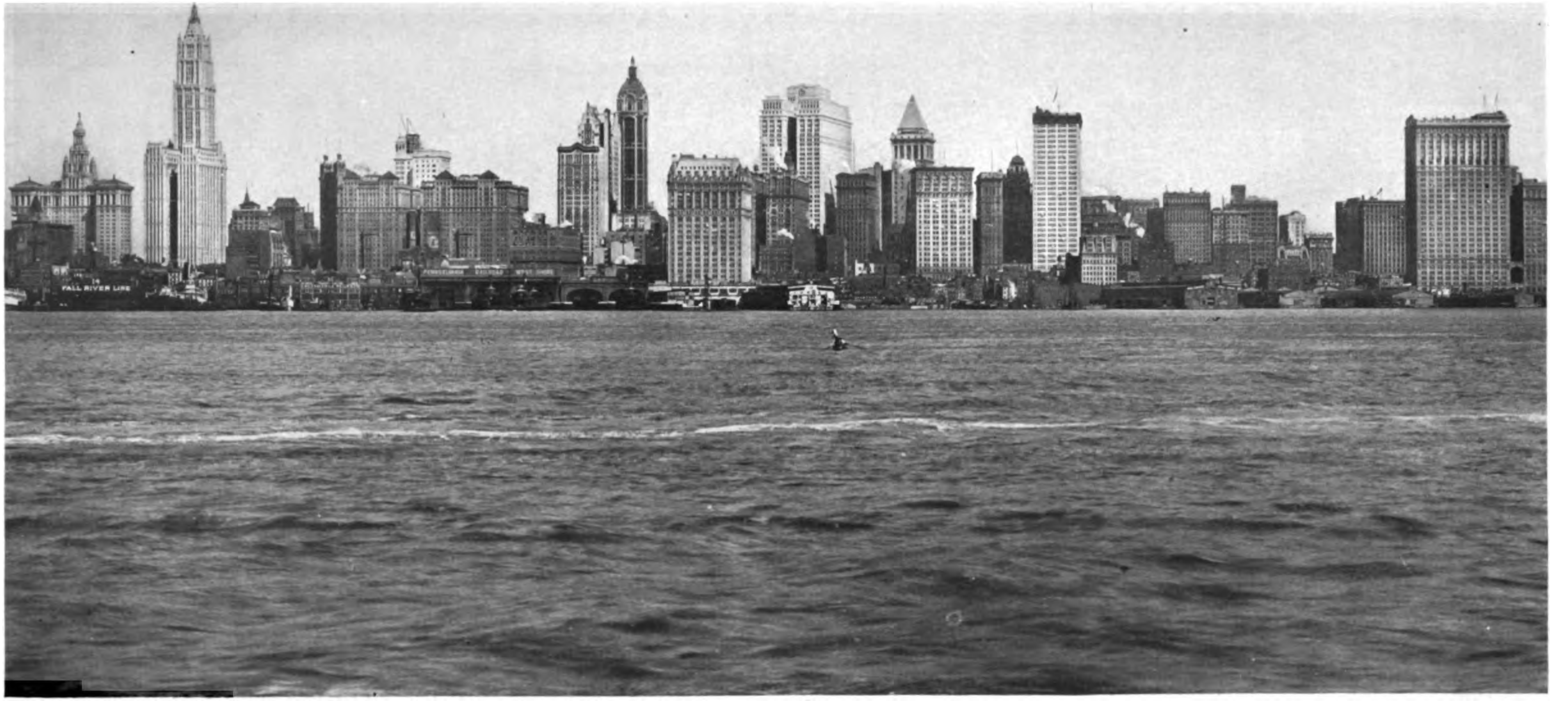
Harbor. The harbor proper consists of the lower and upper bays, the former covering about 88 square miles of anchorage and the latter 14 square miles. Between the two is Staten Island. The principal passage from one to the other is by way of the east channel called The Narrows, which at one point is only a mile in width. Small vessels may pass also on the west side of the island. The harbor is approached from the ocean from two directions, the principal one being from the southeast. The Sandy Hook bar stretches across this entrance, about 20 miles from the lower end of Manhattan, the deepest channel having been originally 16 feet at mean low water. In 1884 the national government provided for dredging this channel to a width of 1000 feet and a depth of 30 feet. In 1899 a provision was made for the dredging of another entrance channel farther to the east, 2000 feet wide and 40 feet deep, requiring an excavation about 7 miles in length. This is known as the Ambrose Channel and was opened for general traffic in 1913, though not then entirely completed. The other entrance into the harbor is from Long Island Sound. From the Sound the passage leads through Hell Gate, at Wards Island, into the East River, which is about half a mile in width. The tide flows very swiftly through the river, especially the ebb tide. Extensive improvements were begun on this course about 1868 and are still going on. The channel has been made amply deep and safe for coastwise traffic. In 1901 the battleship *Massachusetts*, drawing 27 feet of water, successfully passed through it. The great strength of the ebb-tide current serves to keep the port open in winter and, in a measure, to prevent the deposit of sediment. The North River, which is about a mile in width, does not carry as much sediment as most rivers. Some dredging, however, has been necessary.

The Sandy Hook entrance to the southeast is guarded by elaborate fortifications on Sandy Hook. (See FORT HANCOCK.) The passage through The Narrows is protected by Fort Hamilton on the east (Long Island) shore and by Forts Tompkins and Wadsworth on the west (Staten Island) shore. Besides the works at the east entrance of Long Island Sound, the approach from that direction is defended by fortifications on the closely approaching points, Throggs Neck and Willets Point, within the limits of the city, and on Davids Island, a few miles to the north. Governors Island, just south of Manhattan, is also fortified.

Almost the entire water front of Manhattan, 123 miles, is deep enough to admit of heavy shipping. The total frontage within the limits of the greater city is 577.5 miles. The docks already constructed occupy but a small part of the available space. Docks and piers naturally were built first on the lower end of Manhattan, the line gradually being extended northward on both sides of the island. The line is almost unbroken on the west side for a distance of about 4 miles, and many piers are still farther north. On the east docks are less numerous. In Brooklyn the docks extend along that portion of the shore opposite the lower end of Manhattan and farther south in Gowanus Bay. Improvements at Jamaica Bay were (1915) being carried out, to admit large ocean liners.

A part of the water front of Manhattan was acquired by the city from the crown of England, and subsequently State laws added to the portion belonging to the city. Eighteen per cent of its entire water front was owned by the city in 1913, including 260 piers, 215 of them being in Manhattan. Fifty-two per cent of the city's holdings are in Manhattan. The Brooklyn water front is owned mainly by private persons. Here are the principal bathing beaches of the city, among them being Coney Island, which is world famous.

Transportation. New York City has profited immensely from the advantages of internal transportation afforded by the Hudson River and the Erie Canal. In recent years the canal traffic has decreased. The canal is still of great



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NEW YORK

VIEW OF THE SOUTHERN END OF MANHATTAN ISLAND FROM THE HUDSON RIVER

importance, however, owing to its competition with the railway lines. This importance will be greatly increased by improvements (1915) under way. The State of New York is deepening and enlarging it into a barge canal at an estimated expense of $101,000,000. All the railroads which approach New York from west of the Hudson River have their terminals in New Jersey. These lines are the Pennsylvania, the West Shore, the Erie, the New York, Ontario and Western, the Lackawanna, the Philadelphia and Reading, the Lehigh Valley, the Central Railroad of New Jersey, and the Baltimore and Ohio. The Pennsylvania Company, with its tunnel from the New Jersey shore under North and East rivers to Long Island, has its terminals partly in Jersey City, partly in Manhattan, and partly on Long Island. The lines which approach from the north, the New York Central and Hudson River and the New York, New Haven, and Hartford, have a union passenger station, the Grand Central Station, under the control of the New York Central. The Long Island Railroad maintains terminals in Long Island City and Brooklyn and runs into the Pennsylvania Station in Manhattan through tunnels under the East River and Manhattan. The daily traffic on all these lines to the suburbs is enormous. The New York Central also runs a freight line down the West Side through Eleventh Avenue, to the wholesale food-supply section of the city.

Trade. The port of New York includes all the municipalities on New York harbor and the Hudson River. In 1913, 57.8 per cent of the total imports and 37.2 per cent of the total exports, or 47 per cent of the total foreign trade of the United States, passed through New York, its commerce being more than six times that of the next largest American port. The imports for 1914 were valued at $1,040,380,526 and the exports at $864,596,338. While the trade is rapidly increasing, there has been in recent years a relative decrease, the port in 1882 having had nearly 57 per cent of the total trade of the country. New York has practically a monopoly in the trade between the European countries and the Great Lakes and Northwest regions. On the other hand its location places it at a disadvantage with the more southern Atlantic coast ports in the trade with the lower Mississippi and the Ohio valley regions. Some of the leading imports of the country, such as rubber and elastic goods, silk goods and furs, are received almost wholly through New York. It also imports the bulk of manufactured goods generally, including manufactures of cotton, linen, and jute goods, jewelry and precious stones, chemicals, coffee, cocoa, and tobacco. It leads in imports of sugar. The relative rank of the city is much lower in respect to the principal exports of the country. It exports less than one-third of the animal products, less than one-fifth of the breadstuffs, corn, wheat, flour, etc., the shipments of the latter class having decreased in recent years, and only about one-twelfth of the cotton. It exports a large part of the copper and most of the machinery. In 1913, 328 sail and 3538 steam vessels engaged in the foreign trade cleared the port of New York. Their tonnage was 14,370,619, and in 1915 the tonnage was 15,767,574. The volume of the coastwise trade greatly transcends that of the foreign trade. The transfer of freight at the port of New York is done almost wholly through the use of barges, lighters, etc., as there are no railroad tracks along the docks.

Manufactures. The value of the manufactured products of New York is considerably more than 50 per cent greater than that of any other American city. Manhattan and Bronx alone rank first, Brooklyn alone ranks fourth. Of 15 industries selected by the census of 1910 for comparison between the great manufacturing centres, New York City held first rank in five. The total capital invested in manufactures in 1910 was $1,364,352,683, and the value of products aggregated $2,029,692,576. The industrial prominence of the city is not due to large iron and steel, textile, or meat-packing interests—the industries which have been responsible for the growth of many American cities—but rather to a large group of manufactures peculiar to city life and mainly of local interest. The city's most important industry is the manufacture of clothing. In the census year 1909 the value of women's clothing (factory product) was $266,477,381 and of men's clothing $218,411,030, besides a great amount of custom work and repairing and dressmaking. The aggregate output of all industries in but two other cities exceeded the value of the clothing product of New York. The abundance of cheap, unskilled labor, in consequence of the large immigrant population, partially explains the growth of this industry. Much of the work used to be done in tenement houses and small workshops and comparatively little in large factories, but now it is the other way about. In the printing and publishing business, the value of which in 1909 was $183,509,157, New York ranks far above other American cities. The slaughtering business ranks third in value of product, which in 1909 was $95,862,000. Among other industries are the roasting and grinding of coffee and spices, the manufacture of foundry and machine-shop products, malt liquors, tobacco, cigars and cigarettes, millinery and lace goods, carpets, men's furnishing goods, fur goods, shirts, furniture, musical instruments, paints, and electrical apparatus and supplies. New York has hardly a rival in the variety of its highly finished manufactured articles. There are in Brooklyn extensive foundries and machine shops, aëroplane factories, and establishments for the roasting and grinding of coffee and spices.

Government. The first charter of Greater New York went into effect Jan. 1, 1898. But it was found defective in several important respects, and in 1901 the Legislature made radical changes. Under the amended charter the mayor is elected for four years. Much power and responsibility is given him, especially in the appointment and removal of administrative officers. The heads of 16 of the 17 administrative departments (law; police; fire; water supply, gas, and electricity; street cleaning; bridges; parks; docks and ferries; health; public charities; corrections; education; taxes and assessments; licenses; Bellevue and allied hospitals; and tenement houses) are appointed by the mayor, as are also certain other officers, including three civil-service commissioners. He may remove any of these officers at will except members of the board of education, aqueduct commissioners, trustees of the College of the City of New York, trustees of Bellevue and allied hospitals, and judicial officers. Legislation is mainly in the hands of a single body, the board of aldermen, consisting of 73 members elected for two years, the president of the board being elected by the whole city. The aldermanic districts generally coincide with the districts into which the city is divided for the election of members of the State Legislature. Exclusive power to grant franchises has been transferred to the board of estimate and apportionment. Power to enact sanitary ordinances rests with the board of health. The mayor's veto is final when placed upon grants of franchise, but as to all enactments of the board of aldermen it may be overridden. Many interests are provided for through local government, the five boroughs being divided into 25 local improvement districts. In each district there is a local improvement board consisting of the president of the borough or chairman and those members of the board of aldermen who represent aldermanic districts included in the local improvement district. In each borough a president is elected, in whom important powers are vested. The borough presidents control such matters as the grading and paving of streets, sewers, public baths, etc., and the president of Queens and Richmond have control also of street cleaning. Each borough has a bureau of buildings, the superintendent of which is appointed by the borough president and is subject to removal by him. Most of the offices in the departments are filled in accordance with civil-service requirements.

Police, Fire, and Health Departments. The police commissioner appoints all members of the force from the eligible lists furnished by the civil-service commission and has power of dismissal as well as demotion. He is assisted by five deputies. The department includes also 135 captains, one of whom is detailed as chief inspector with 18 others detailed as inspectors in charge of the 18 inspection districts. The total force in 1915 of men and officers was 10,740, including 67 civilians. For patrol service the city is divided into 95 precincts, each having its own building with quarters for the men, cells for prisoners, and lodgings for homeless persons. Each precinct is in command of a captain under whom are several lieutenants and sergeants. The patrolmen serve in a training school and pass a period of probation before attaining full powers. See POLICE.

In 1915 the fire department of New York City had an active force of 5014 men. There were 184 engine companies, including 10 fire boats, and 76 hook and ladder companies. The companies constitute battalions, each under the command of a chief of battalion. The fire chief is at the head of the entire fire-fighting force. Recently a bureau of fire prevention has been created which inspects as to fire hazards. The horse-drawn vehicles were in 1915 being rapidly replaced by automobile apparatus.

The health department is administered by a board of health, consisting of a commissioner appointed by the mayor, the commissioner of police, and the health officer of the port. The sanitary superintendent is chief executive officer of the board. A corps of sanitary and medical inspectors is employed for the detection and prevention of disease and the enforcement of the sanitary code. There are also a vaccinating corps, a corps for disinfection, and one for the inspection of milk, meat, and other food products. Many powers originally possessed by the health department as to tenement houses have been transferred to the tenement-house department, which is charged with enforcing the tenement-house law in all flats and apartments.

Water Supply. Manhattan and the Bronx have an excellent water supply derived from the Croton River (q.v.), supplemented by the Bronx and Byram watersheds. The Croton River, which is nearly 40 miles north of the City Hall, includes in its basin a number of small natural lakes and seven artificial reservoirs, the largest of the latter being the New Croton Reservoir, which was formed by building a masonry dam 297 feet in height across the main stream of the river. The seven reservoirs store 71,800,000,000 gallons, and about 2,900,000,000 gallons can be drawn from the small lakes. Two additional storage reservoirs which have, together, a capacity of 23,000,000,000 gallons have been constructed. A further supply is being developed in the Catskill region. The huge Ashokan, nearing completion in 1915, has a capacity of upwards of 150,000,000,000 gallons. Within the limits of the city two receiving and distributing reservoirs were built in Central Park, and a third reservoir was constructed at Jerome Park in the twenty-fourth ward of the city. A small high-service reservoir was built at High Bridge. With the Jerome Park Reservoir the storage in the city amounts to 3,115,000,000 gallons. The water is conveyed from the Croton Reservoir to the city by two aqueducts—the Old Croton Aqueduct (built 1837–42), having a daily capacity of 75,000,000 gallons, and the New Croton Aqueduct (built 1885–92), capable of delivering 300,000,000 gallons per day. The average consumption of water was, in 1913, more than 500,000,000 gallons per day in the greater city. The Brooklyn water supply is at present obtained from small local streams, ponds, and wells, but that borough is now all piped for the new supply from the Ashokan Reservoir. There is a large reservoir in the eastern part of the borough and a small one near the entrance to Prospect Park. The daily consumption in this borough is about 140,000,000 gallons.

Finance. The budget of New York is considerably more than four times that of any other American city and greater than that of any other city in the world. The actual income for 1914 was $197,682,519, including $2,063,326 received from the State for schools. Of this amount, $142,994,191 was collected from property taxes, $5,558,771 from liquor licenses, $10,673,688 from special assessments, $12,881,161 from water rates, and $8,448,550 from docks, ferries, and subways. The total payments for the same year were $143,112,979 for maintenance and operation and $74,745,418 for construction and capital outlay other than loans repaid. The principal items of expenditure for maintenance and operation were: schools, $40,240,452; interest on debt, $42,065,333; police department, $15,764,845; fire department, $10,123,844; hospitals, asylums, almshouses, and other charities, $12,209,369; water supply, gas, and electricity, $11,665,831. The principal items for construction were: rapid-transit construction, $24,952,041; schools, $4,916,121; bridges, $1,405,429; docks and wharves, $3,908,633. There is a funded debt of $359,437,873 and a floating debt of $105,985,867. Against this funded indebtedness there is a sinking fund of $1,307,020,221. The city's legal borrowing limit (exclusive of the water debt) is 10 per cent of the assessed valuation. The basis of assessment is legally 100 per cent of the value of real property subject to tax. The valuable franchises which have been granted to private companies return an entirely disproportionate income to the city treasury.

The expenses of Greater New York are much larger than were the combined expenses of the various component municipalities before consolidation. The increase in the first year after consolidation amounted to $15,000,000. This is due largely to the creation of more salaried offices and to increases in salaries. The salaries paid are the highest prevailing in any city of the world. There is a board of estimate and apportionment, consisting of the mayor, comptroller (elected by popular vote), president of the board of aldermen (each having three votes), and the five borough presidents (the presidents of Manhattan and Brooklyn having two votes each), which annually submits the budget to the board of aldermen. The board of aldermen cannot insert new items, increase the amount specified, or vary the stipulated terms and conditions; but there are certain items which it may reduce. The financial department is in charge of the comptroller and is divided into six bureaus, in addition to which there are seven independent divisions. All officers in the department except the city chamberlain, or treasurer, are appointed by the comptroller.

Population. Greater New York has over twice the population of any other American city and is exceeded only by London among the cities of the world. This has come about almost wholly in the nineteenth century, during which time the city grew at a rate never equaled. In the Colonial period New York ranked below Boston and Philadelphia. In 1790 there was a population of 33,131; 1800, 60,515; 1810, 96,373; 1820, 123,706; 1830, 202,589; 1840, 312,710; 1850, 515,547; 1860, 813,669; 1870, 942,292; 1880, 1,164,673; 1890, 1,441,216; 1900 (after the creation of Greater New York), 3,437,202, and in 1910, 4,746,889, including 2,331,542 in the Borough of Manhattan, 430,980 in the Borough of the Bronx, 1,634,351 in the Borough of Brooklyn, 284,041 in the Borough of Queens, and 85,969 in the Borough of Richmond. In 1914 the population was 5,333,539 according to United States estimate. The suburbs on the New Jersey shore of the Hudson (Jersey City, Hoboken, etc.) contain over 300,000 inhabitants. Beyond these we come to a section of New Jersey embracing Elizabeth, the Oranges, Montclair, Morristown, Plainfield, and many other places which are mainly suburbs of New York, in addition to the two great manufacturing centres of Newark and Paterson, also the homes of great numbers of New York business men. These places have a total population of over half a million. On the northeast the cluster of towns largely inhabited by persons doing business in New York extends beyond the boundary line of Connecticut. Among these may be mentioned New Rochelle, Rye, Port Chester, Greenwich, and Stamford. The total population embraced within a radius of 25 miles from the New York City Hall has been estimated at 7,500,000. As the city grew the population of New York naturally tended to centre about the lower end of Manhattan, the business district. Inconveniences, too, incident to transportation across the river have aided in confining the population within the narrow limits of Manhattan Island, where the density of population is greater than in any other city whatsoever. The distribution of the population in Brooklyn is more normal. The density per acre in New York County in 1910 was 68.2. The region of greatest density is the lower East Side, where in the eighth assembly district, covering 98 acres of area, there was in 1910 a population of 1113.3 to the acre. In the densely populated section, tenement houses having an average height of five or six stories, inadequately lighted and ventilated, and otherwise lacking in sanitary facilities were the rule. Many large model tenement houses have been built, notably those of the City and Suburban Homes Company. The housing problem is one of the most difficult with which the city has to deal and presents phases almost unknown in other large centres of population. A radical tenement-house law, which went into effect in 1902, is bringing about a great improvement. The problem of congestion is closely related to that arising from the presence in the city of large classes of mostly poor foreigners. The various foreign elements tend to form distinct colonies. In the eighth district, above mentioned, 72.3 per cent of the population in 1910 were foreign born, and over 98 per cent of the remainder were children of foreign-born parents. In 1910 the foreign-born whites numbered 1,927,703, or 40.4 per cent of the total population of the city. In Manhattan alone 47.4 per cent of the total population was foreign born. New York has been always a strikingly cosmopolitan city. During the middle of the nineteenth century there was a very heavy German and Irish immigration to the city, but before the end of the century the immigration of these nationalities had greatly declined, and there had begun a heavy immigration from the south and east of Europe. According to the census of 1900 the principal foreign countries represented in the immigration to New York City in order of prominence were Germany, Ireland, Italy, Russia, Bohemia, Austria-Hungary, Poland, England, Scotland, and Wales. In 1913, on the other hand, these countries in order of prominence were Italy, Russia, Austria-Hungary, and Germany, most of the Russian and Austro-Hungarian immigrants being Jews. Few of the many Scandinavian immigrants to the United States have settled in New York. Nearly one-fourth of the population of Manhattan are Jews. A large proportion of New York immigrants represent a class of unskilled laborers. The German immigrants, however, have always contained a large class of skilled artisans, who have participated in the more advanced industrial life of the city and have contributed greatly to its social and artistic life. A much larger percentage of the Irish have been unskilled laborers. The Italians have come mainly from the poorer districts of south Italy, and almost all are laborers. Most of the coarser labor of the metropolis is done by them. The Jewish immigrants, like the Italians, are extremely poor and mostly unskilled. The majority are employed in the manufacture of clothing; many, however, are small merchants. Both of these elements keep to themselves. It is in the parts of the city occupied by them that the density of population is greatest. The negro population in 1910 numbered 91,709. Of the total population of the city, 2,382,482 were males and 2,384,401 females.

History. Probably the first European to visit the vicinity of New York was Giovanni Verrazano, who came in 1524, and in 1525 the Spanish navigator Gomez sailed into the harbor. In September, 1609, Henry Hudson (q.v.) explored the harbor and the river; in 1613 Adrian Block built four trading houses on the present site of 41 Broadway, the first habitations of white men on Manhattan Island—Manhatanis (those who dwell upon an island) being the name applied to the aboriginal Delaware inhabitants; and in 1614 Block built here his little vessel the *Restless*, probably the second ship to be built in America. In 1614 the States-General of Holland chartered the United New Netherland Company of Amsterdam. This company the same year built Fort Manhattan, where the present Custom House is at Bowling Green. In 1621 the West India Company, succeeding the earlier company, was chartered. In 1623 Cornelis May became Director General, or Governor. In 1624 May was superseded by Verhulst, who in turn was replaced in 1626 by Peter Minuit. Minuit in this year bought the island from the Indians for goods valued at 60 guilders, or $24 (about $120 in present values), and replaced Fort Manhattan with the more substantial Fort Amsterdam, within which was built the first church edifice on Manhattan Island. The settlement then had a population of less than 200, and was called New Amsterdam. In 1628 the first clergyman, Rev. Jonas Michaelius, arrived at New Amsterdam. Wouter van Twiller, Governor of the Colony from 1633 to 1638, in 1636 gave to a colonist the tract since known as the Annetje Jans Farm, lying between the present Warren and Charlton streets west of Broadway. William Kieft, Governor from 1638 to 1647, in 1641 established the first cattle fair at Bowling Green. In 1642 he built the first house of entertainment on the site of 73 Pearl Street, and it afterward became the first Stadt Huys, or City Hall. In 1643 the Dutch massacred 120 Algonquin Indians, who had come to them for protection, and an Indian war ensued, lasting for two years and almost depopulating the settlement. In 1644 a fence was built across the island to form a protection against the Indians, and in 1653 was replaced by a wall of wood. This was removed in 1699, its line being marked by the present Wall Street. Peter Stuyvesant was Governor from 1647 to 1664. In 1653 New Amsterdam, with a population of about 800, was incorporated as a city.

In March, 1664, Charles II granted New Netherland to his brother James, Duke of York, and on September 8 Col. Richard Nicolls with an English force took possession of the city and renamed it New York. Nicolls was Governor until 1668. He was succeeded by Francis Lovelace, who in 1670 established the first Exchange, where merchants met once a week to barter. On Aug. 9, 1673, the Dutch regained possession, and the province became New Netherland as before, the city becoming New Orange, and Anthony Colve replacing Lovelace as Governor. On Nov. 10, 1674, the Dutch again gave way to the English, Edmund Andros becoming Governor; in 1686 the first city charter, known as the Dongan Charter, from Thomas Dongan, Governor in 1683–88, was issued (though it was never confirmed by James II); and in 1689, Andros being overthrown, Leisler usurped control and held it until early in 1691, when he was executed for treason. See **Leisler, Jacob.**

In 1690 the first intercolonial congress (called to consider an attack on Canada) was held in New York—Massachusetts, Plymouth, Connecticut, Maryland, and New York being represented—and in the same year the only mayor elected by the people until after 1832 was chosen. Slavery had been introduced in 1625; in 1712 a negro insurrection was put down with much cruelty, 21 negroes being executed (some by burning, others by hanging, and one by breaking on the wheel); and in 1741 the discovery of a supposed plot, the Great Negro Plot, caused a panic, during which four whites were executed, and 154 negroes were arrested, of whom 13 were burned at the stake, 18 were hanged, and 71 were transported. In 1693 William Bradford set up the first printing press in New York; in 1696 the first Trinity Church was built; in 1697 the streets were first lighted with lanterns; in 1700 the first library was opened; in 1703 the first free school was opened; in 1711 a public slave market was established; in 1714 the first public clock was set up in Wall Street; in 1725 the first newspaper was founded; and in 1731 the first fire department was organized. In 1732 a monthly stage was established between New York and Boston, the trip taking two weeks each way, and in 1756 a Philadelphia stage, taking "three days through only," began running.

John Peter Zenger, who had founded the *New York Weekly Journal* in 1733, was arrested and prosecuted for libel by the authorities in 1734, but he was acquitted in the following year after a famous trial—his acquittal being regarded as the greatest vindication in the Colonial period of the freedom of the press. See **Zenger, John Peter.**

In 1765 the Stamp Act Congress (see **Stamp Act**) met in New York, and on Jan. 18, 1770, nearly seven weeks before the Boston Massacre, British soldiers killed one citizen and wounded three after the soldiers had destroyed a liberty pole set up by the Sons of Liberty. This riot, called the battle of Golden Hill, is ranked by some writers as "the first conflict of the War of the American Revolution," and the inn in front of which it took place still stands at 122 William Street. In 1774, during the excitement over the tea tax, a ship loaded with tea was sent back to England, and the cargo of another was thrown overboard. When news of the battle of Lexington reached New York, a Committee of Safety assumed control of the city, and Governor Tryon took refuge on a British man-of-war. In the early summer of 1776 a large part of the American troops were quartered in New York. On July 8, in the presence of Washington, the Declaration of Independence was for the first time publicly read to them on the Common, now City Hall Park, and on the ninth the equestrian statue of George III, erected on Bowling Green in 1770, was torn down. On Sept. 4, 1776, a short time after the battle of Long Island (q.v.), the city was evacuated by the Americans and was occupied on the following day by the British, who held it until Nov. 25, 1783—Evacuation Day. On Sept. 15, 1776, a large portion of the city was destroyed by fire. During the British occupation the city was the refuge of Loyalists, who came from all quarters to take advantage of British protection, many of the more wealthy and influential residents joining their ranks. From 1785 to 1790 Congress met in New York in the old City Hall, at the corner of Wall and Nassau streets, and here Washington was inaugurated April 30, 1789. In this year Fort Amsterdam at Bowling Green was demolished and the Government House erected on its site as a residence for Washington.

In 1789 the Tammany Society (q.v.), or Columbian Order, was organized. During an epidemic of yellow fever, from October, 1794, to July, 1795, more than 600 persons, and during another in 1798 more than 2000 persons, died. In 1790 the population numbered 33,131, and the city limits were extended to the lower line of the present City Hall Park; in 1805 the population was 78,770, and since then, especially after the War of 1812, when immigration greatly increased, the growth has been very rapid. In 1807 Fulton's steamboat, the *Clermont*, began running regularly between New York and Albany; in 1812 a steam ferry to Long Island was opened; in 1818 a line of Sound steamers was established; while in 1819 the *Savannah*, built in New York, successfully crossed the Atlantic. The Erie Canal, begun in 1817, was completed in 1825—the first boat, *Seneca Chief*, reaching New York on November 4. In this year gas was introduced into the city. In 1832 an epidemic of cholera caused the death of 4000 persons, and another two years later caused the death of nearly 1000. In 1833 the first penny newspaper was started. In 1835, December 16–19, occurred the Great Fire, when the entire East Side below Wall Street, including about 650 stores, and the most important buildings of the city, was destroyed, with a loss of almost $10,000,000. The financial panic of 1837 caused many failures, and the great destitution and suffering in the city led to the Bread Riots of that year. From 1820 to 1870 riots were frequent, one of the most serious being the Astor Place Riot (q.v.) of May 10, 1849, in which 141 soldiers were wounded, while 34 rioters were killed and many more were wounded. In the same year more than 5000 persons died of the cholera. Another riot occurred in 1857, growing out of a conflict between two police organizations, when the Seventh Regiment of militia was called out to preserve the peace. The Croton Aqueduct, bringing a supply of water from the Croton River 40 miles above the city, was completed in 1842 at a cost of $9,000,000; in 1845 Morse first publicly tested his telegraph-recording apparatus; and on July 14, 1853, the Crystal Palace Industrial Exhibition was opened on what is now Bryant Park. Another severe financial panic occurred in 1857, followed by suspension of many of the banks and a number of business failures.

On the approach of the Civil War many in the city seemed to favor the South, and in January, 1861, the mayor, Fernando Wood (q.v.), proclaimed secession to be "a fixed fact" and proposed that an independent commonwealth, to be called Tri-Insula, be formed out of Manhattan, Long, and Staten islands. The city, however, loyally supported the Union during the war, sending to the front 116,382 soldiers at a cost of about $14,500,000. In July, 1863, occurred the Draft Riots (q.v.), lasting three days, during which business was suspended, property worth more than $1,500,000 was destroyed, and more than 1000 lives were lost. The city suffered for several years from frauds, perpetrated by the Tweed Ring, which controlled municipal affairs; but in 1871 the Ring was convicted of having robbed the city of more than $20,000,000 and was effectually broken up. (See TWEED, WILLIAM M.) In 1869 a financial panic, caused by the effort to corner gold, culminated on Black Friday (September 24), gold then being at 162½. The financial panic of 1873 caused the greatest suffering in New York City, although its growth continued unabated. On May 24, 1883, the Brooklyn Bridge was formally opened, and in 1886 the Bartholdi Statue of Liberty was unveiled. New York has been the scene of many imposing processions and celebrations: on the occasion of Lafayette's visit in 1824; the celebration of the opening of the Erie Canal in 1825; the funeral processions of Lincoln, April 25, 1865, and of General Grant, Aug. 8, 1885; the laying of the Atlantic cable in 1858; the opening of the Brooklyn Bridge; the centennial celebration of Washington's inauguration as President of the United States, in 1889 (from April 29 to May 1); the Columbian celebrations of October, 1892, and April, 1893; the reception to the Santiago fleet in 1898; the Dewey reception in 1899; the Hudson-Fulton celebration in 1909. See Plates of ARCHITECTURE; BRIDGES; DAMS.

The flag of the city, which was officially adopted on June 24, 1915, after having been passed upon and accepted by the Art Commission, is in color orange and blue, divided by a white band on which are the city arms in blue.

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NEW YORK, College of the City of. A free college, maintained by the city of New York, standing in the same relation to the municipality as the American State university to the State. Established in 1848 by the board of education of the city, in pursuance of the provisions of an Act of the State Legislature passed in 1847 and ratified in the same year by a vote of the people of the city, it was originally known as the Free Academy, but in 1854 was endowed by the Legislature with collegiate powers and privileges. In 1866 the institution was given its present name, again by Act of the Legislature.

The college was originally located at Lexington Avenue and Twenty-third Street, but removed in 1907 to what has been called the Acropolis of the city, a plot bounded by Amsterdam Avenue and St. Nicholas Terrace, 136th and 140th streets. Here it is housed in a group of five buildings which, erected at the same time and planned to form a harmonious whole, constitute one of the finest architectural groups in the city. To these original buildings has recently been added a stadium, the gift of Mr. Adolph Lewisohn and the one structure which the college owes to private generosity.

The institution is a college in the strict sense of the word: it has no graduate department and no professional schools. Its various courses are framed with a view to general training in the first years and wisely directed specialization in the latter years, and lead to the degrees of Bachelor of Arts and Bachelor of Science. Identical courses are offered in the Evening College for the benefit of those whose days must be otherwise occupied. The college also maintains a preparatory department, offers extension courses in the several boroughs of the city to teachers in the public schools, and collaborates with departments of the city administration in various fields of governmental and scientific investigation.

The registration of the college for the year 1914–15 was as follows: day session, 1802; evening session, 776; extension courses, 3140. The instructing staff during the same year numbered 214. Dr. Sidney E. Mezes, who was formerly president of the University of Texas, was called to the presidency of the college in December, 1914.

NEW YORK ACADEMY OF SCIENCES, The. An association incorporated in 1818 as *The Lyceum of Natural History in the City of New York*, which was exchanged in 1876 for the present name. In 1902 the academy was empowered by legislative enactment to obtain funds and erect a building for scientific uses. Membership in the academy consists of active members, fellows, corresponding members, and honorary members. Fellows are chosen from the active members in virtue of their scientific attainments. The following sections of the academy are in active operation: astronomy, physics, and chemistry; biology; geology and mineralogy; anthropology and psychology. The academy publishes Annals and Memoirs. Its headquarters and library are at the Museum of Natural History.

NEW YORK BAT. See Red Bat.

NEW YORK HISTORICAL SOCIETY. A society formed for the collection and preservation of materials relating to the national, civic, or ecclesiastical history of the United States in general and the State of New York in particular. The idea of such a society was first agitated in Massachusetts in 1789 by John Pintard, but it was not until Nov. 20, 1804, that the New York Historical Society was organized by a number of leading citizens, among them De Witt Clinton, Anthony Bleecker, and Peter G. Stuyvesant. The library has a choice and valuable collection of books, lithographs, maps, manuscripts, engravings, etc., besides a collection of works on heraldry. The picture gallery contains 889 paintings, of which about 200 are portraits, and 600 pieces of sculpture, mostly portrait busts and medallions. The collection includes the New York Gallery of Fine Arts, the works of the American Art Union, the Bryan Gallery of Old Masters, the Durr collection, and the original water colors prepared by Audubon for his work on natural history. In the department of antiquities there is the Abbott collection of Egyptian antiquities, considered one of the greatest in the world. In 1906 a new building was erected in New York City at Seventy-sixth and Seventy-seventh streets and Central Park West.

NEW YORK PUBLIC LIBRARY. The New York Public Library, Astor, Lenox, and Tilden foundations, was formed by the consolidation on May 23, 1895, of the Astor Library, the Lenox Library, and the Tilden Trust.

The Astor Library, incorporated Jan. 18, 1849, was founded by John Jacob Astor, who bequeathed $400,000 to establish a free public library; gifts from other members of the Astor family trebled its buildings, added largely to its book collections, and increased its endowment to $941,000 in 1895. Opened Feb. 1, 1854, with about 80,000 volumes, in 1895 it had 267,147 volumes.

The Lenox Library, incorporated Jan. 20, 1870, received from James Lenox his library, art collection, its site and building, and an endowment amounting to $505,500 in 1895. It was not a general reference library, but an institution for the exhibition and scholarly use of book rarities. In 1895 it contained 86,000 volumes.

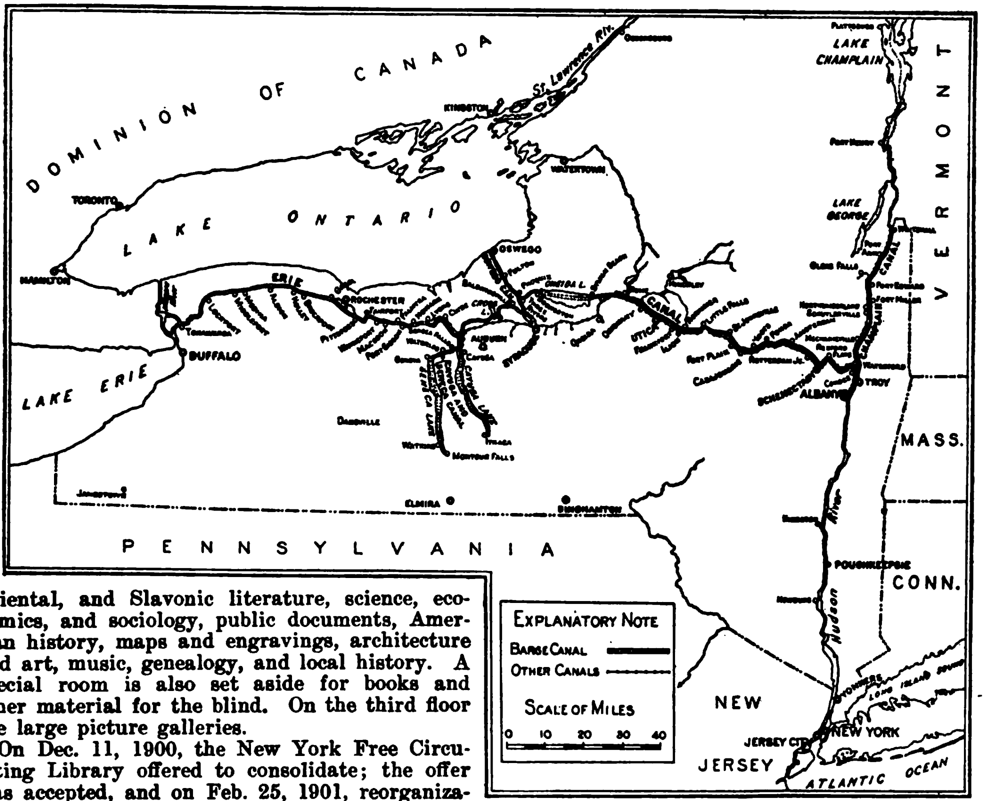
The Tilden Trust was incorporated March 26, 1887. To it (before incorporation) Samuel Jones Tilden had bequeathed his private library, 20,000 volumes, and the bulk of his estate, over $5,000,000, to establish a free public library. The will was contested and the trust provisions declared invalid. By a compromise agreement the executors secured for the library trust about $2,000,000, part of the share of one of the heirs.

The new corporation had an endowment of about $3,446,500, owned the Astor and Lenox library sites, and possessed 353,147 volumes and pamphlets. Through an address to the mayor legislative permission was secured May 19, 1897, for an issue of bonds by the city to construct a building on the reservoir site at Forty-second Street and Fifth Avenue, and to contract with the library for its occupancy. Plans were adopted Nov. 10, 1897, and the corner stone was laid Nov. 10, 1902. The building was opened on May 23, 1911. It has seating accommodation in the main reading room and other public rooms for 1760 readers. The main stack room contains 334,530 feet of shelving and the special rooms another 70,000 feet with a total capacity for about 3,000,000 books. Besides the main reading room the library also includes rooms for the circulation of books, children's reading, newspapers, current periodicals, technology, patents, and special rooms for Jewish, Oriental, and Slavonic literature, science, economics, and sociology, public documents, American history, maps and engravings, architecture and art, music, genealogy, and local history. A special room is also set aside for books and other material for the blind. On the third floor are large picture galleries.

On Dec. 11, 1900, the New York Free Circulating Library offered to consolidate; the offer was accepted, and on Feb. 25, 1901, reorganization was completed. The following libraries also came into the system: St. Agnes Free Library on Aug. 1, 1901; Washington Heights Free Library on Dec. 1, 1901; the New York Free Circulating Library for the Blind on Feb. 21, 1903; Aguilar Free Library on Feb. 24, 1903; Harlem Free Library, Tottenville Free Library, Webster Free Library, and University Settlement Library on Jan. 1, 1904.

On March 12, 1901, Andrew Carnegie offered to give about $5,200,000 to erect branch libraries in New York City, if the city would furnish sites and maintain the branch libraries when built. An Act passed April 26, 1901, permitted the city to accept such a gift, and in a contract executed July 17, 1901, between the city and the library acting as Carnegie's agent, the city agreed to provide 42 (later increased to 65) sites in Manhattan, Bronx, and Richmond, on which the library agreed to erect buildings with funds provided by Carnegie, the city agreeing to pay annually for their maintenance one-tenth of the sum expended by Carnegie. The first building so erected, on East Seventy-ninth Street, for the Yorkville branch, was opened Dec. 13, 1902; in the next four years 18 others were opened; and, in 1915, 32 branches were maintained.

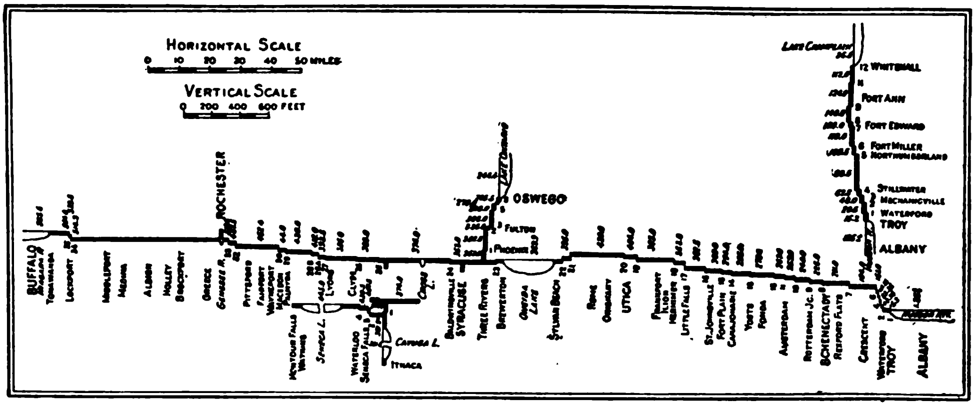
In 1914 (June 30) there were 1,251,208 volumes and pamphlets in the reference department, 1,019,165 in the circulation department; 1,953,984 volumes were consulted in the reference department by 622,501 readers, while 8,824,289 volumes were taken out of the circulation department.



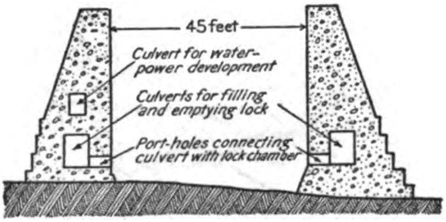
LOCATION OF NEW YORK STATE BARGE CANAL.

Note the difference in route between the Barge Canal and the old Erie Canal indicated by dotted line.

NEW YORK STATE BARGE CANAL. A system of waterways in the State of New York, based on the improvement and enlargement of four previously existing canals—the Erie Canal, the Champlain Canal, the Oswego Canal, and the Cayuga and Seneca Canal. The Barge Canal improvement involved approximately 440 miles of improvement or new construction, and the canalization of 350 miles of intervening lakes or adjoining rivers, so that the resulting State waterway system, known as the Barge Canal, amounts to some 790 miles. This provides a channel with 12 feet of water, at least 75 feet wide at the bottom, while in lakes and rivers in which 72 per cent of the whole system lies, the width is 200 feet. The Barge Canal, in the main, follows natural watercourses; consequently there is not involved the question of water supply and independent feeders to the extent necessary in the original canals. The territory served by the canal is shown by the fact that 71 per cent of the area of the State of New York is within 50 miles of the waterways and within 77 miles is 88 per cent of the total area, while 46 per cent of the area of the whole State is located within 20 miles of the Barge system.



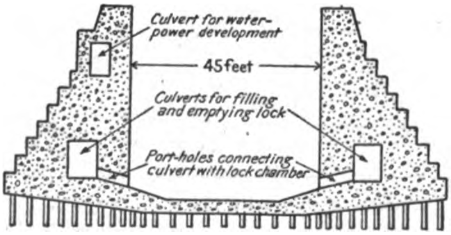
PROFILE OF NEW YORK STATE BARGE CANAL.


45 feet
Culvert for water-power development
Culverts for filling and emptying lock
Port-holes connecting culvert with lock chamber

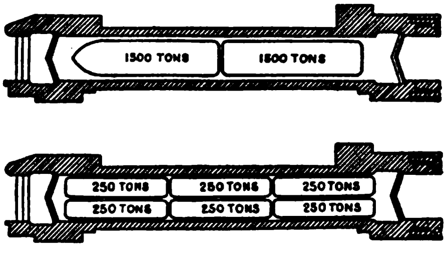
CROSS SECTION OF LOCK CHAMBER, ROCK FOUNDATION.

The first agitation for better canal facilities in New York was started in 1891 and developed in the following year, so that a commission reported in favor of deepening the Erie Canal (q.v.) and Oswego Canal to 9 feet, and the Champlain Canal to 7 feet, at an estimated expense of $9,000,000, duly provided in 1895 by the issue of 3 per cent bonds authorized by the New York State Legislature. This proved only a temporary expedient, and after a thorough survey and canvass of the situation by several engineering commissions, plans were prepared for a comprehensive scheme of development at an estimated cost of $101,000,000, to provide such enlargement, whereby 1000-ton barges could use the Erie Canal, and the dimensions of the Champlain Canal would also be considerably enlarged. This project was ratified by the people of the State of New York at a popular election in the autumn of 1903, the vote of approval being 673,010 as against 427,698. By the proposed enlargement boats 150 feet in length and having a draft of 10 feet could be accommodated in place of boats 98 feet in length and of 7½ feet draft.

The new Barge Canal can carry 10,000,000 tons of freight annually, and this amount eventually can be increased to 20,000,000 tons. As the estimated cost to transport one ton of freight from Buffalo to New York by canal and river is but 26 cents as compared with an average cost of $1.96 for the 440 miles on the New York Central for which the rate of $3 is charged, it will be seen that the canal has important possibilities.


Culvert for water-power development
45 feet
Culverts for filling and emptying lock
Port-holes connecting culvert with lock chamber

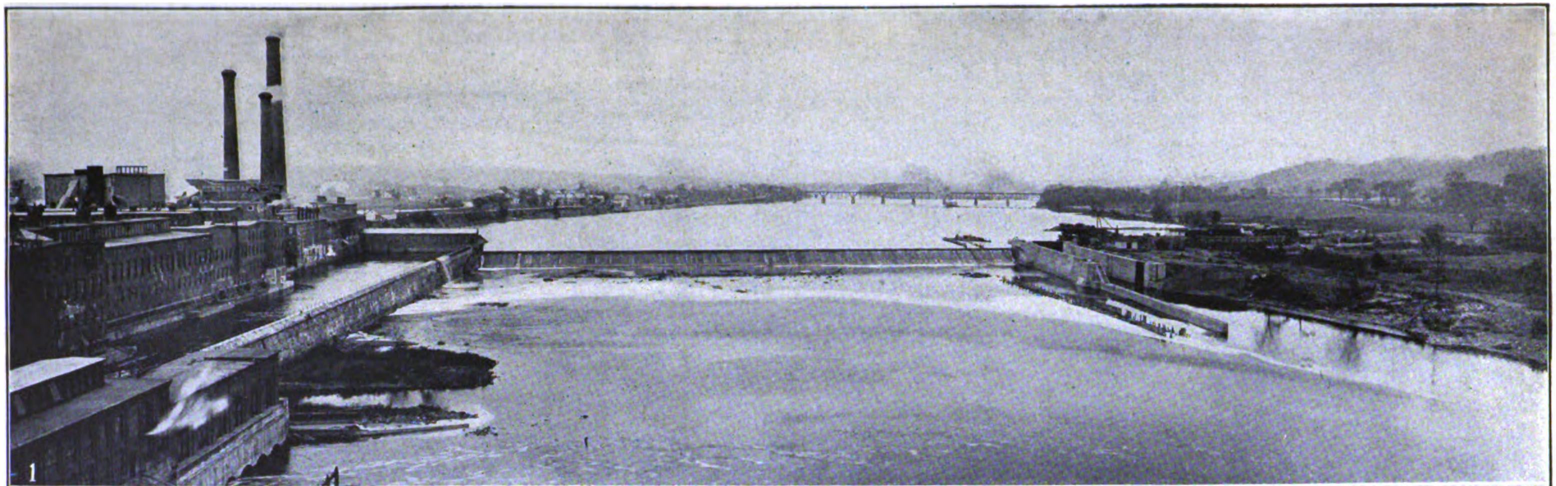
CROSS SECTION OF LOCK CHAMBER, PILE FOUNDATION.

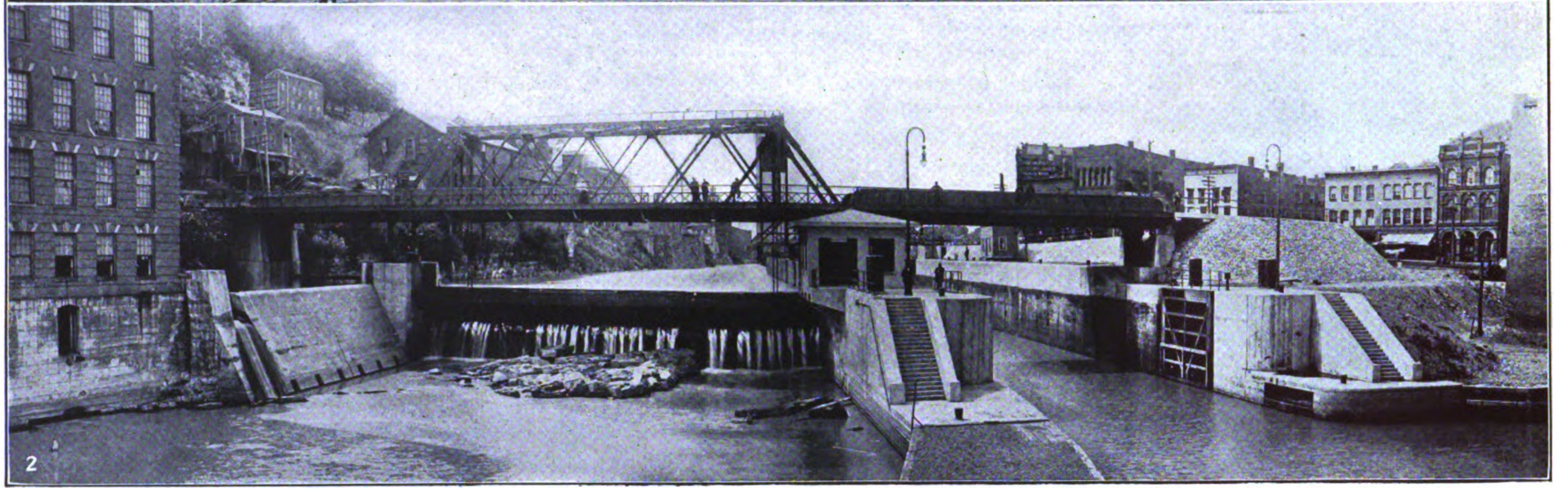


PLAN OF STANDARD LOCK SHOWING TWO 1500-TON BARGES AND SIX 250-TON BARGES.

There are 35 locks on the Erie branch, 11 on the Champlain, 7 on the Oswego, and 4 on the Cayuga and Seneca. The standard length of lock chamber is 311 feet, and this makes possible the lockage of two 150-foot barges at one time. The Barge Canal locks are built of concrete throughout, both side and cross walls and floor, but where rock was encountered, the concrete floor was dispensed with. The lifts range from 6 to 40½ feet, the latter height being at Lock No. 17 at Little Falls, where at

NEW YORK STATE BARGE CANAL

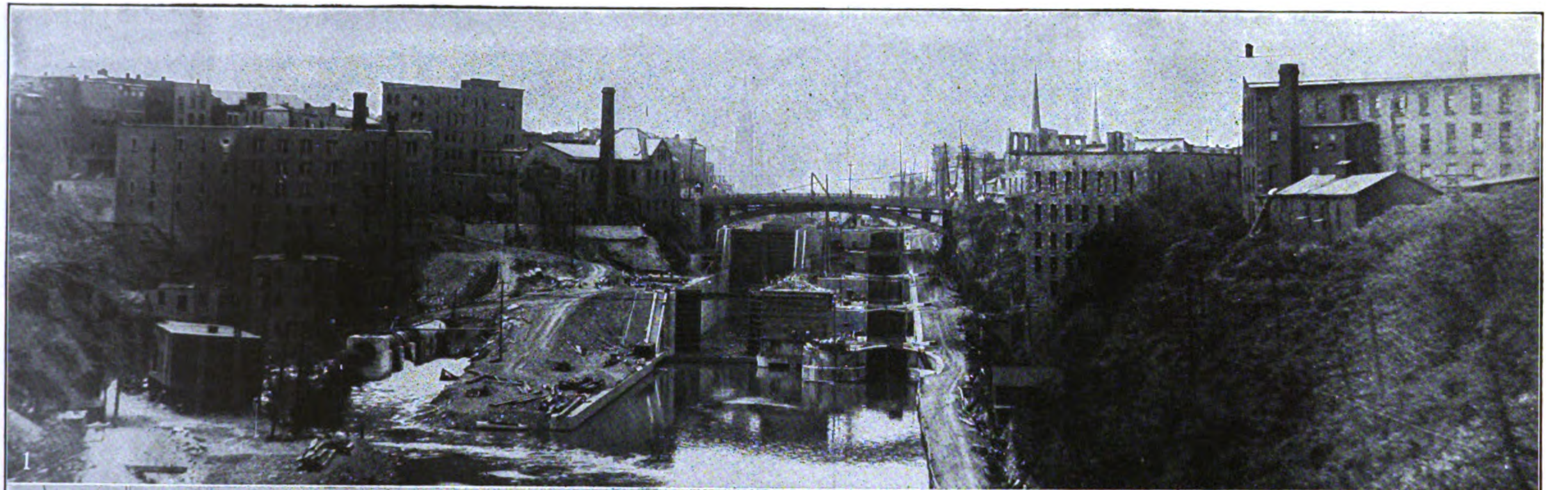


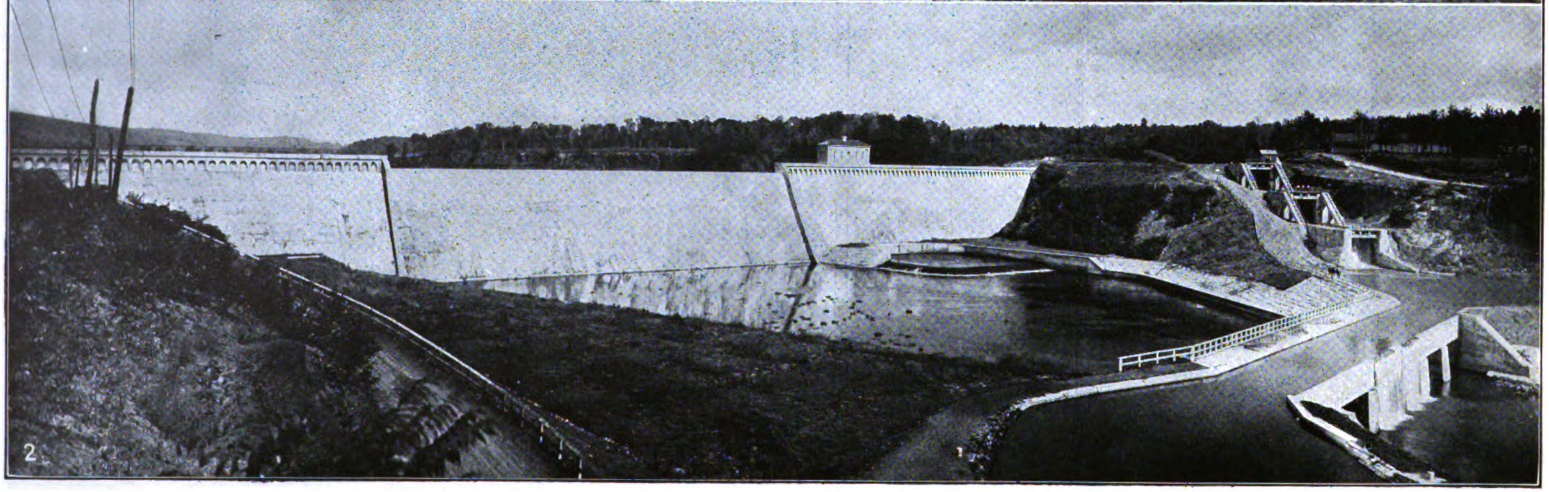


1. **DAM AT MECHANICSVILLE** Here the Hudson River has been canalized by using an existing dam. A portion has been cut away and the lock seen on the right built.

2. **ENTRANCE OF CHAMPLAIN CANAL INTO LAKE CHAMPLAIN.** View at Whitehall, showing a siphon spillway on the left, dam in the centre with movable crest of Taintor gate type operated from highway bridge, and regulating Wood Creek and lock No. 12 with its power house on the right.

NEW YORK STATE BARGE CANAL





1. NEW AND OLD LOCKS AT LOCKPORT
2. DAM AT DELTA. The relocated Black River Canal crosses the Mohawk River on an aqueduct and reaches the upper level by a flight of three locks.

one point of the lock there is the extreme height of side walls of 80 feet. In the city of Oswego there is a unique lock, it being the largest one in which the siphon principle is employed. See illustrations under CANAL.

The Barge Canal system includes 40 dams, two of which, at Delta and Hinckley respectively, form reservoirs; while across the Mohawk below Schenectady, the Crescent Dam has a length of 1922 feet; and the Vischer's Ferry Dam, with a length of nearly 2000 feet, raises the height of the water in the Mohawk River. There are also various movable dams of the bridge type, of the Taintor gate or sector type, and of the Poirée type; while there are numerous siphon spillways to maintain the proper level of water.

For the western section of the Erie Canal, the water is obtained from the Niagara, and for the Rome summit level new reservoirs were built at Delta and Hinckley, while at various points old and new channels bring the water from sources of supply. In addition to the canal itself a number of terminals were built at cities and villages on the route, and at various connecting watercourses or harbors as on the Hudson River, on New York and Buffalo harbors, and elsewhere.

A single boat of such size that its capacity might be 2000 tons or more can be used, while boats of a capacity of about 1500 tons could be locked two at a time, and could pass each other even in the minimum canal channel. As two of these could be passed at a single lockage, 3000 tons could be transported by a power barge with a cargo barge of the same capacity in tow. One power boat and three accompanying cargo boats of moderate size would fill one lock.

The total estimate of amount of work performed to Dec. 1, 1914, and in effect on that date, was about $79,425,961 for the Erie, Champlain, and Oswego canals, and $5,023,988 for the Cayuga and Seneca Canal. The appropriation bill of 1915 allowed the sum of $3,675,000 for work on the canal so that the existing contracts would be carried out, while it was voted by the Legislature to call for a referendum on a bond issue of $27,000,000 to complete the entire canal programme.

Consult: A. B. Hepburn, *Artificial Waterways of the World* (New York, 1914); *Annual Reports of the State Engineer and Surveyor* (Albany), special reports on canals; files of *Engineering News* (New York) and *Engineering Record* (ib.), where full and detailed accounts of the progress and general discussion will be found. See CANAL; ERIE CANAL.

NEW YORK UNIVERSITY. An institution for higher education in New York City. It had its inception at the meeting of certain citizens in January, 1830, in the rooms of the New York Historical Society, when a committee of nine was elected to proceed in the establishment of a new university on a liberal and a comprehensive foundation. The plan of the founders contemplated a college, engineering school, school of law, school of medicine, school of education, school of agriculture, and a graduate school. The charter was obtained April 18, 1831. The first chancellor was the Rev. James M. Matthews, D.D. The site at Washington Square was acquired in 1833 and the corner stone of the first university building was laid in the summer of that year. The institution opened with the regular college courses and with special courses in mathematics and science for engineers. The law school was established in 1835 and the medical college in 1839. The early period of the university was rendered distinctive by the service of certain of its professors to the community. Prof. Samuel F. B. Morse invented the recording telegraph and Dr. John W. Draper perfected Daguerre's system of photography and took the first picture of the human countenance within the university walls; while Dr. Valentine Mott as dean of the medical college and Benjamin Butler as principal of the law faculty rendered prominent service to their respective professions.

The expansion of the institution into its present organization of nine degree-giving schools and three divisions has taken place since 1890. The magnificent site at University Heights of more than 40 acres was acquired during this same period, the first accession being in 1891. The acquisition of new property was accompanied by the reorganization of the existing university schools and the addition of new schools as the pressure of the times demanded them. The instruction is now carried on at four different centres as follows: at University Heights—the College of Arts and Pure Science (1831) granting the degrees of B.A. and B.S.; the School of Applied Science (1862) granting the degrees of B.S. in civil engineering, mechanical engineering, and chemical engineering, and the advanced degrees of C.E., M.E., and Chem.E.; and the Summer School (1895). At Washington Square—the School of Law (1835) granting the degrees of LL.B., LL.M., and J.D.; the Graduate School (1886) granting the degrees of M.A., M.S., Sc.D., and Ph.D.; School of Pedagogy (1890) granting the degrees of B.S. in Pedagogy, Pd.M., and Pd.D.; School of Commerce, Accounts, and Finance (1900) granting the degrees of B.C.S. and M.C.S.; the Washington Square College (1903) granting the degrees of B.A. and B.S.; the Woman's Law Class (1890) granting the chancellor's certificate upon completion of a course of lectures on the principles of law; and the Extramural Division (1908), which is organized for the purpose of conducting courses for university credit outside the university walls. At First Avenue and Twenty-sixth Street is the University and Bellevue Hospital Medical College (1839) granting the degrees of M.D. and D.P.H., and at 141 West Fifty-fourth Street is the New York State Veterinary College (1899) granting the degree of D.V.S.

There were in all departments of the university in 1915, 6580 students and 428 professors and instructors. The grounds of the university are valued at $1,263,000 and the buildings at $2,293,000. The library of the university contains 115,000 volumes and 95,000 pamphlets. The university received in tuition fees in 1913–14 the sum of $451,000. The corporation of the university is the Council, a self-perpetuating body of 32 members, one-fourth of whom go out of office annually. The Women's Advisory Committee, consisting of women appointed by the Council, was organized in connection with the founding of the School of Pedagogy in 1890 and has done effective service in the university's work for women, aiding in the raising of endowment, furnishing of equipment, and the establishment of new courses. Dr. Elmer Ellsworth Brown, formerly United States Commissioner of Education, was elected chancellor in

1911, succeeding Henry M. McCracken, who served from 1891 to 1910, and retired in the latter year as chancellor emeritus.

NEW YORK WEASEL. See WEASEL.

NEW ZEALAND, zē′land, DOMINION OF. A British possession in the South Pacific Ocean, situated between lat. 34° 25′ and 47° 17′ S. and long. 166° 26′ and 178° 36′ E., a little more than 1000 miles southeast of the Australian continent. New Zealand proper consists of two large islands, North Island and South or Middle Island, separated by Cook Strait, from 16 to 90 miles wide, and of a smaller island, Stewart Island, lying 25 miles south of South Island, from which it is separated by Foveaux Strait. Several of the outlying groups, known as the Auckland, Chatham, Cook, Kermadec islands, and other small islets, are also attached to the Dominion. The area of North Island is 44,468 square miles, of South Island 58,525, and of Stewart Island 665 square miles. The area of the Dominion is estimated at 104,751 square miles, being nearly equal to that of Italy, to which peninsula the shape of New Zealand bears a striking resemblance.

Topography. The surface of North Island is in the main gently undulating, with low hills and table-lands densely forested. There are, however, several volcanic peaks in this island, from 4000 to over 9000 feet high. Of these Tarawera and Tongariro, on the mainland, and Whakari, in the Bay of Plenty, are active volcanoes, while the highest extinct cones are Ruapehu (9715 feet) and Mount Egmont or Taranaki. The latter is a solitary peak standing at the west entrance to Cook Strait. It is 8270 feet high, and its summit is covered with perpetual snow. South Island differs in a marked degree from North Island. It has no volcanoes, but along its whole west coast runs a lofty and rugged mountain range known as the Southern Alps, which rivals the European Alps in its wild mountain scenery. It has a height of from 8000 to over 12,000 feet, Mount Cook, the highest point, being 12,349 feet above the sea. It is deeply cleft, with numerous ravines and precipices, while on the west slope there are great glaciers, in some places reaching within a few hundred feet of the sea. The range is generally covered with forests to the snow line. On the eastern flank of the Alps is a plateau bounded by a lower range running through the centre of the island, from which the land descends in terraced, grassy plains to the east coast.

The coast line of New Zealand measures about 3000 miles, two-thirds of which forms the coast of North Island, which is much indented with bays, two of them almost separating the northwestern peninsula from the mainland. Really good harbors, however, are few, as most of the bays are obstructed by bars. The best harbors are those of Auckland and Wellington. The rivers are small and unimportant, the largest being the Waikato, in North Island. The lakes by contrast are interesting. Those in North Island are of volcanic origin. The largest is Lake Taupo, with a diameter of 22 miles and an enormous depth. The region surrounding it is full of hot springs and geysers, among which rose the famous pink and white terraces of siliceous deposits which were destroyed by an eruption in 1886. In South Island, along the east slope of the Alps, extends a series of elongated mountain lakes supposed to be, like the deep fiords of the southwest coast, the result of glacial erosion acting upon folds of upheaval. The largest is Wakatipu, which rivals Lake Lucerne in beauty. Though its surface is 1060 feet above sea level, its bottom is in some places 500 feet below.

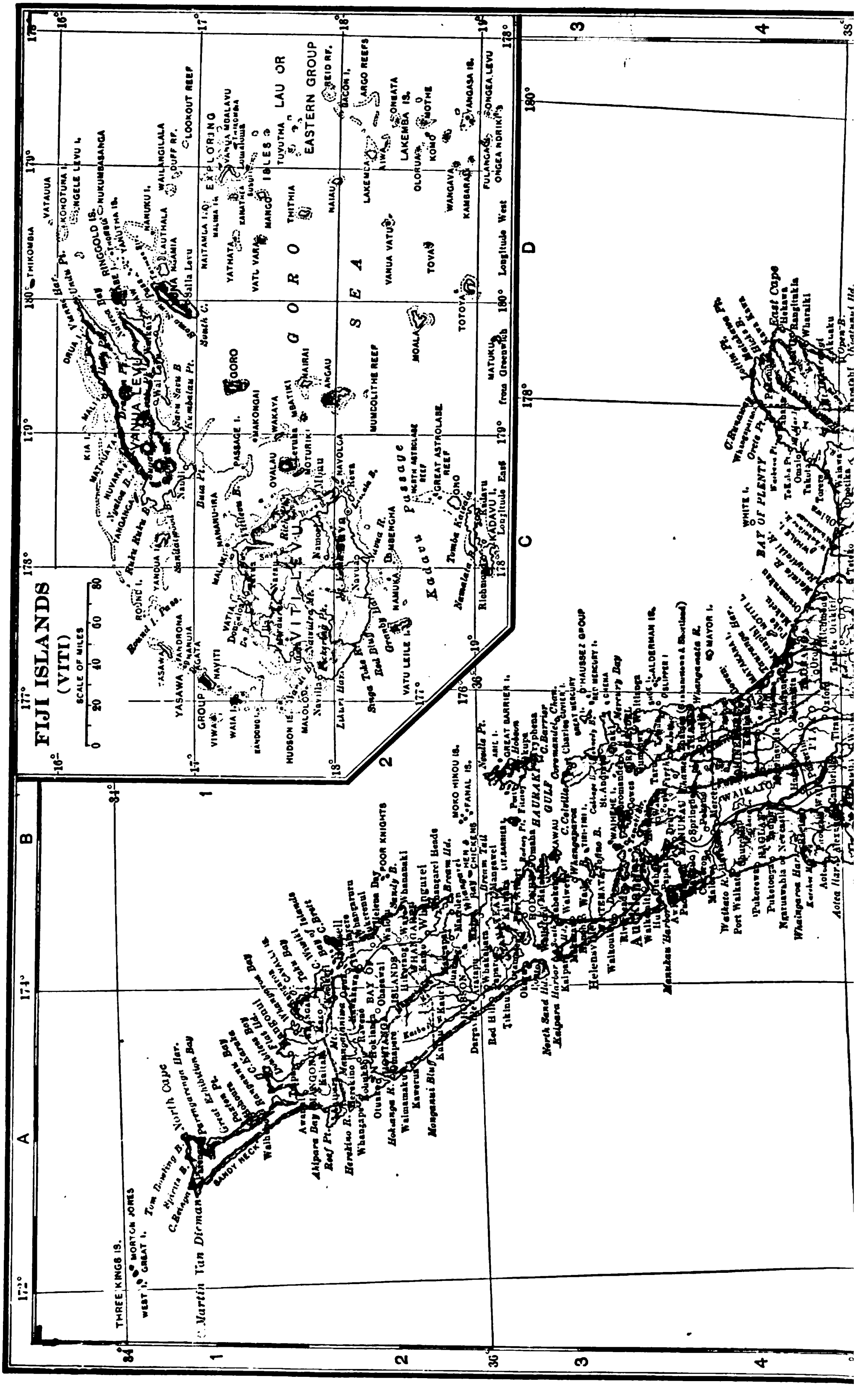
Climate. The climate is varied, but in general equable, with no intense heat or cold. The mean temperature for January is 61° F. in the north and 58° F. in the south; for June it is 50° F. in the north and 44° F. in the south. Frost is almost unknown in North Island. The rainfall varies from 28 inches in the east to over 100 inches on the west coast. The coast districts are very windy, which fact contributes towards rendering the climate healthful.

Flora. The flora is poor in species, but two-thirds of the indigenous forms are entirely peculiar to the islands, and 26 of its genera are represented nowhere else. The forests as well as the vegetation generally are characterized by a dull monotonous green, there being very few plants with conspicuous flowers. Though the flora is related to that of Australia, as well as that of South America and the Antarctic islands, some of the most common Australian genera, such as *Eucalyptus* and *Acacia*, are absent. The ferns, mosses, and hepaticas are especially abundant and characteristic, large tracts of open land on the lower hills and plateaus being covered with ferns, among which the palm-like tree ferns, which reach a height of 30 to 40 feet, are prominent. The nikau palm (*Areca sapida*) is found in both islands, this being the extreme southern limit of true palms. One of the most common forest trees is the magnificent kauri pine (*Agathis australis*). It yields fine timber and has been recklessly cut by settlers; a valuable gum in a partly fossilized state is found on the site of former kauri forests. The output of this gum in 1905 was valued at £561,444.

Fauna. The fauna is, like the flora, characterized by a great paucity of species. There is probably not a single indigenous mammal, the dogs and rats found by the European discoverers having been almost certainly introduced by the Polynesian settlers. There are few reptiles, and no snakes, but several peculiar lizards. Insects are also few, as are the fresh-water fishes; and birds form almost the only group of animals that is well represented. There are about 150 species of birds, most of which are aquatic, and nearly all are peculiar to the islands. They include many beautiful forms, pigeons and parrots being especially numerous. The kiwi (*Apteryx*, q.v.), a wingless and tailless bird of the size of a hen, is the sole survivor of a large group of similar birds, including the gigantic moa (q.v.), which formerly inhabited New Zealand. A considerable number of European forms, both plants and animals, have been introduced, wild pigs being very common.

Geology and Minerals. North Island is essentially volcanic in structure and origin, while South Island consists largely of ancient metamorphic and sedimentary rocks, slates, granites, and Silurian sand and limestones, with small areas of Mesozoic and Tertiary strata. Coal is found under a considerable area in South Island, and to some extent in North Island. Gold exists chiefly under the glacial drift and in the shore sands. Silver, copper, tin, antimony, manganese, and chrome iron are also found.

Mining. Many minerals are found in New


FIJI ISLANDS
(VITI)
SCALE OF MILES
0
20
40
60
80
VITI LEVU
VANUA LEVU
KORO SEA
LAU OR EASTERN GROUP
EXPLORING ISLES
YASAWA GROUP
Kadavu Passage
KADAVU I.
Longitude East from Greenwich
Longitude West
THREE KINGS IS.
North Cape
C. Maria Van Diemen
BAY OF ISLANDS
HAURAKI GULF
AUCKLAND
WAIKATO
BAY OF PLENTY
East Cape
WHITE I.
GREAT BARRIER I.
POOR KNIGHTS
HEN & CHICKENS
A
B
C
D
1
2
3
4
34°
36°
38°
16°
17°
18°
19°
172°
174°
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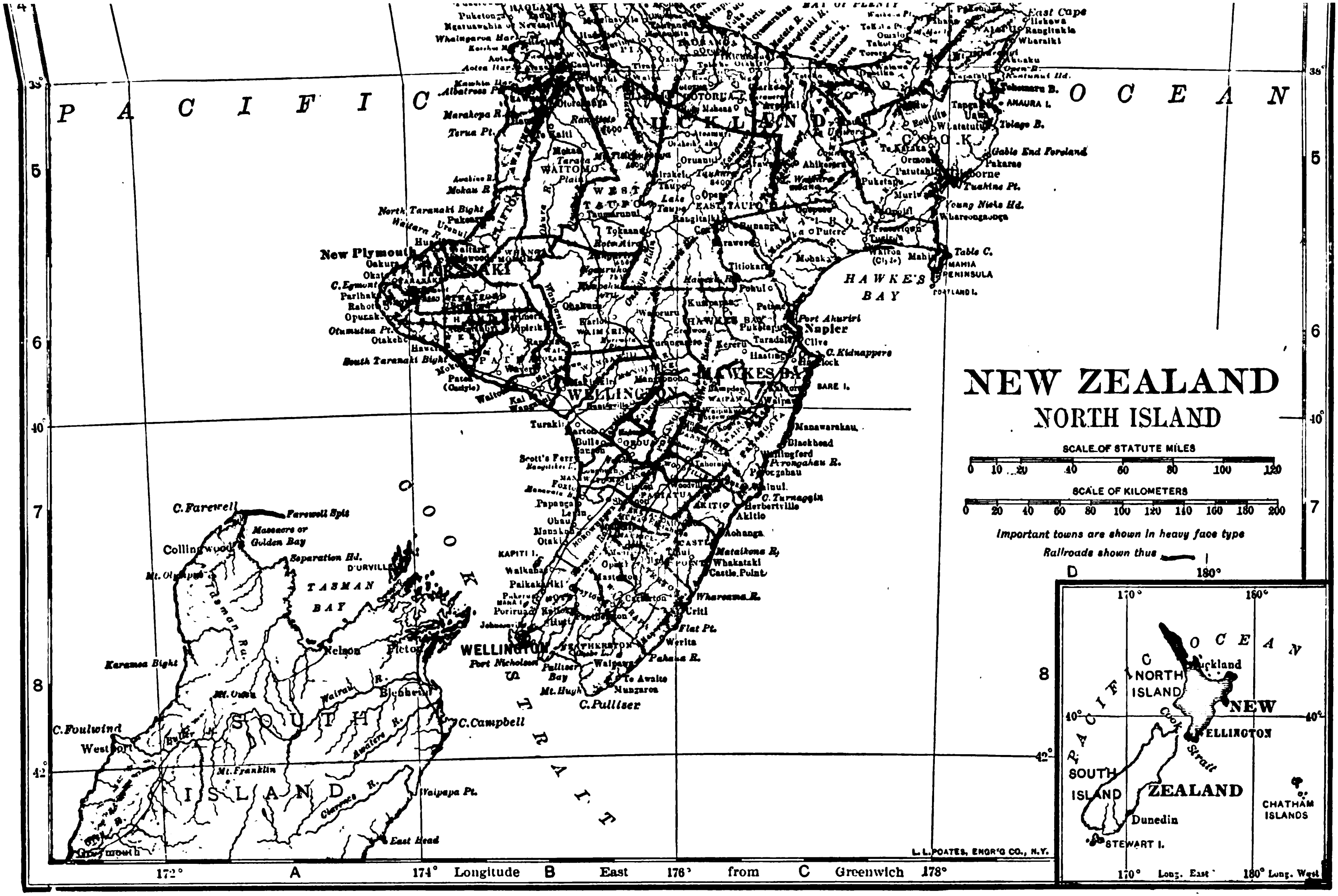
179°
180°


NEW ZEALAND
NORTH ISLAND
SCALE OF STATUTE MILES
0 10 20 40 60 80 100 120
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Important towns are shown in heavy face type
Railroads shown thus
P A C I F I C O C E A N
C O O K S T R A I T
HAWKE'S BAY
TASMAN BAY
SOUTH ISLAND
New Plymouth
Napier
WELLINGTON
Nelson
Picton
Blenheim
Westport
Greymouth
C. Farewell
Farewell Spit
Massacre or Golden Bay
Collingwood
Separation Hd.
D'URVILLE I.
Karamea Bight
C. Foulwind
C. Campbell
C. Palliser
C. Egmont
C. Kidnappers
C. Turnagain
Table C.
MAHIA PENINSULA
East Cape
Gable End Foreland
Gisborne
North Taranaki Bight
South Taranaki Bight
TARANAKI
WAITOMO
WEST TAUPO
EAST TAUPO
Lake Taupo
AUCKLAND
COOK
HAWKES BAY
WELLINGTON
BAY OF PLENTY
ROTORUA
Wanganui
KAPITI I.
Port Nicholson
Palliser Bay
Mt. Hugh
Tasman Ra.
Mt. Franklin
Waipapa Pt.
East Head
BARE I.
PORTLAND I.
L. L. POATES, ENGR'G CO., N.Y.
172° A 174° Longitude B East 176° from C Greenwich 178° D 180°
38° 40° 42°
5 6 7 8
PACIFIC OCEAN
NORTH ISLAND
Auckland
NEW
WELLINGTON
Cook Strait
SOUTH ISLAND
ZEALAND
Dunedin
STEWART I.
CHATHAM ISLANDS
170° Long. East 180° Long. West
40°

Zealand, but mining as an important industry is confined to gold, coal, kauri gum, and silver. The total mineral production, as recorded from the beginning of mining in 1853, to the end of 1910, was valued at £111,624,794, of which £77,437,131 represented gold, £16,709,820 coal, £15,413,445 kauri gum, and £1,618,522 silver. The relative importance of the New Zealand districts in gold production may be seen from the following, the figures showing the value of gold entered for export in the year ended March 31, 1911, and the total value from 1857 to that date: Otago, £416,941 and £28,493,897; West Coast (of South Island), £381,259 and £22,362,587; Auckland, £1,111,099 and £19,856,029; Nelson, £6254 and £6,842,315; Marlborough, £332 and £351,856; Wellington, total £708; Canterbury, £383. From 1862, the year after gold was discovered in paying quantity in Otago, to 1873 was the most productive period of gold mining. Later years witnessed a decline in the large output of Otago and the West Coast, while in Auckland there was a notable development. The gold output in 1903 was valued at £2,037,831; in 1908, £2,004,925; in 1913, £1,459,499. The mining of gold by the dredging method is practiced extensively in the Clutha River bed and other streams of that district. Most of the gold from the South Island has been secured either by this method or by hydraulic sluicing. Gold from the Auckland district is obtained from quartz only, as also much of the Westland product. The cyanide process has been introduced, resulting in a greatly increased percentage of the ore saved. Coal production showed a steady increase from 162,218 tons in 1878 to 613,895 tons in 1888, to 1,888,005 (valued at port of shipment at £1,043,138) in 1913. In 1912 the output of kauri gum was 7908 tons (valued at £401,305). Silver reached a maximum production of 1,813,830 ounces in 1908 (valued at £180,872); in 1913, 975,616 ounces (£103,866).

Agriculture. Agriculture together with grazing is the leading occupation. The climatic conditions are more favorable for general agriculture than in any of the states of the Australian Commonwealth. The rainfall is adequate and the yield per acre of all crops much greater. The largest farming district is on the east coast of the South Island. About two-thirds of the total area is supposed to be adaptable to agriculture or grazing. Holdings of more than one acre in 1910–11 numbered 73,876 (42,503 in the North Island and 31,313 in the South Island), representing 40,238,126 acres of occupied land. The very large holdings are decreasing in number. The following table shows by provincial districts the acreage in 1910–11 of grain and pulse crops, green and root crops, fallow, sown grasses on plowed land, sown grasses on unplowed land, orchard and vineyard, total land in cultivation, tussock or native grass and unimproved land, and total land in occupation:

DISTRICTS	Grain and pulse	Green and root	Fallow	Grasses plowed	Grasses unplowed	Orchard and vineyard	Total cultivated	Unimproved, etc.	Total occupied
Auckland	52,811	57,502	56,201	802,262	2,541,999	12,035	3,546,646	4,222,402	7,769,048
Taranaki	11,984	23,982	3,274	211,189	793,385	953	1,046,709	311,562	1,358,271
Hawke's Bay	22,819	35,573	7,281	356,925	1,405,543	2,421	1,835,470	1,375,616	3,211,086
Wellington	49,327	58,799	7,183	357,980	2,699,664	3,646	3,184,807	1,249,948	4,434,755
North Island	136,941	175,856	73,939	1,728,356	7,440,591	19,055	9,613,632	7,159,528	16,773,160
Marlborough	36,344	11,614	3,189	100,255	421,898	592	576,091	1,864,018	2,440,109
Nelson	32,071	18,475	5,445	139,318	418,063	4,894	623,472	1,690,644	2,314,116
Westland	668	1,524	778	9,903	73,768	208	86,948	874,120	961,068
Canterbury	474,503	228,936	64,708	1,455,519	507,446	3,943	2,756,882	3,830,705	6,587,587
Otago:									
Otago portion	193,994	136,995	40,220	818,416	227,346	3,081	1,428,588	6,569,364	7,997,952
Southland portion	141,301	140,282	21,694	748,459	125,403	960	1,180,277	1,983,857	3,164,134
South Island	878,881	537,826	136,034	3,271,870	1,773,924	13,678	6,652,258	16,812,708	23,464,966
New Zealand	1,015,822	713,682	209,973	5,000,226	9,214,515	32,733	16,265,890	23,972,236	40,238,126

Included in the above totals for the South Island is a negligible acreage for Stewart Island. The total area under crop in New Zealand increased from 68,506 acres in 1861 to 1,044,777 in 1891, and 1,729,504 in 1911 (312,797 in the North Island and 1,416,707 in the South Island). The two counties having the largest acreage under crop in 1911 are both in the South Island, viz., Southland, with 218,260 acres, in Otago provincial district, and Ashburton, with 203,661 acres, in Canterbury provincial district. Below are shown the acreage and yield of the principal crops in 1901–02, 1910–11, and 1913–14.

CROPS	ACRES			BUSHELS		
	1901–02	1910–11	1913–14	1901–02	1910–11	1913–14
Wheat	163,462	322,167	189,993	4,046,589	8,290,221	8,746,207
Oats	405,924	302,827	399,986	15,045,233	10,118,917	19,865,306
Barley	26,514	33,491	34,999	855,993	927,112	1,372,667
Potatoes	31,259	29,023	29,163	*206,815	*141,510	*120,555
Corn	12,503	13,057	6,499	571,834	569,807	336,630
Rye	1,090	4,395	......	27,250	106,271	......
Peas	7,242	14,829	......	164,712	511,600	......
Beans	3,504	1,798	......	88,905	72,150	......
Rye grass	16,244	46,706	......	356,765	1,167,650	......
Cocksfoot	27,876	41,918	......	†4,481,340	†5,868,520	......

* Tons. † Pounds.

Stock Raising. Probably no other country of similar area equals New Zealand in the extent of its sheep-grazing interests. The number of sheep increased steadily from 2,761,383 in 1861 to 19,826,604 in 1895, and, in 1914, to 24,798,763. The wool clip in 1912 was 194,645,904 pounds, of which 188,361,790 pounds were exported.

The following table shows the number of live stock at 10-year intervals:

YEAR	Horses	Cattle	Sheep	Swine
1861	28,275	193,285	2,761,383	43,270
1871	81,028	436,592	9,700,629	151,460
1881	161,736	698,637	12,985,085	200,083
1891	211,040	831,836	18,128,186	308,812
1901	266,245	1,256,680	20,233,099	250,975
1911	404,284	2,020,171	23,996,126	348,754

The distribution of live stock in 1911 is shown below:

DISTRICTS	Horses	Cattle	Sheep	Swine
Auckland	115,021	684,387	3,286,019	96,538
Taranaki	26,405	298,160	824,248	50,660
Hawke's Bay	28,908	183,198	3,387,991	13,700
Wellington	60,458	426,244	5,316,095	56,575
North Island	230,792	1,591,989	12,814,353	217,473
Marlborough	8,398	20,702	1,105,043	6,733
Nelson	13,647	45,039	1,098,474	10,563
Westland	3,778	24,614	59,692	2,606
Canterbury	69,951	120,190	4,311,255	68,209
Otago:				
Otago portion	45,320	104,755	2,884,660	25,499
Southland "	32,398	112,882	1,722,649	17,671
South Island	173,492	428,182	11,181,773	131,281
New Zealand	404,284	2,020,171	23,996,126	348,754

The above totals for South Island include a few head (of which, sheep 2961) in Stewart Island. In recent years dairying has rapidly developed, and there is a large production of butter and cheese.

Manufacturing. The following comparative figures are from the censuses of 1906 and 1911 respectively: number of industrial establishments, 4186 and 4402; employees, 56,359 and 56,234; wages paid, £4,457,619 and £5,572,270; horse power, 60,335 and 100,587; cost of materials, £13,163,692 and £20,810,211; value of product, £23,444,235 and £31,729,002; approximate value of land, buildings, machinery, etc., £12,509,286 and £16,731,359. The product of largest value in 1910 (census of 1911) was frozen and preserved meats (£7,304,676), followed by butter and cheese (£3,919,184) and by the tanning and wool-scouring products, and the products of saw mills, grain mills, clothing and boot factories, printing and bookbinding establishments, iron and brass works, etc.

Communications. Excellent facilities for water transportation between various points in the Dominion are afforded by the extensive coast line and the many harbors. The first contract for railway construction was let in 1860, but up to 1870 there were only 46 miles in operation. Six years later the railways—718 miles open to traffic—were taken over by the government. There has continued a small private mileage, which since 1908 has amounted to only 29 miles. Government railways in 1914 aggregated 2863 miles. On March 31, 1914, the capital cost of open lines was £32,355,087; passengers carried (excluding season-ticket holders), 13,355,893; freight, 6,019,633 tons; receipts, £4,043,328; working expenses, £2,880,323. There are tramways in the larger towns. Telegraph lines (excluding railway telegraphs), in 1900, 6910 miles; in 1910, 10,901; in 1914, 13,044.

Commerce. The imports are almost entirely for home consumption, and the exports of domestic origin. The table below showing imports and exports (including specie and bullion) distinguishes trade with the United Kingdom, with British colonies and possessions, and with other countries:

YEAR	U. K.	Brit. cols.	Other	Total
	IMPORTS			
1900	£6,504,484	£2,625,372	£1,516,240	£10,646,096
1905	7,795,284	2,914,358	2,119,215	12,828,857
1910	10,498,771	3,967,053	2,585,759	17,051,583
1912	12,499,787	4,588,001	3,888,786	20,976,574
1913	13,312,193	5,052,051	3,924,058	22,288,302
	EXPORTS			
1900	£10,259,342	£2,332,780	£654,039	£13,246,161
1905	12,087,818	2,593,088	975,041	15,655,947
1910	18,633,118	2,468,119	1,078,972	22,180,209
1912	16,861,256	3,740,691	1,168,634	21,770,581
1913	18,130,160	3,178,434	1,678,128	22,986,722

The principal imports include textiles and apparel, hardware and machinery, vehicles, sugar, tobacco, timber, alcoholic liquors, oils, coal, and tea. The principal exports are shown below, in thousands of pounds sterling:

EXPORTS	1900	1905	1910	1913
Raw wool	4,749	5,381	8,308	8,058
Frozen or chilled meat	2,124	2,694	3,851	4,450
Butter	741	1,409	1,812	2,062
Cheese	229	205	1,195	1,770
Gold	1,440	2,094	1,896	1,430
Sheep, including pelts	279	501	741	800
Flax (*Phormium*)	332	696	448	722
Tallow and oleomargarine	368	348	757	663
Kauri gum	622	561	465	549

The export of raw wool in 1900 amounted to 140,706,486 pounds; in 1913, 186,533,036 pounds. The export of grain is very irregular; for instance, the oat export in 1912 amounted to 4,127,391 bushels and in 1913 to only 239,268 bushels. After the United Kingdom and Australia, the United States stands first in the New Zealand trade; imports from the United States in 1913 were valued at £2,108,050, and exports £912,052.

Shipping. The total net tonnage (exclusive of coasting trade) entered and cleared at the ports increased from 1,679,907 in 1900 to 2,756,238 in 1910 and 3,438,792 in 1913. The shipping is principally British. In 1913 the net tonnage entered at Auckland was 856,317, and cleared 557,815; at Wellington, 504,974 and 671,595. Other ports are Invercargill and Bluff, Lyttleton, Dunedin, Kaipara, Timaru, Westport, Napier, Oamaru, Poverty Bay, Nelson, Greymouth, Picton, and Wanganui.

Banks. Owing to active participation of the Dominion government in the economic life of the community, the field of private banking is a comparatively limited one. In 1913 there were in operation six banks of issue, of which two were wholly New Zealand institutions and the others branches of Australian banks. The total paid-up capital in 1913 was £11,962,994. Average liabilities for the year, £27,591,099, of which deposits £25,733,186, notes in circulation £1,674,334, bills in circulation £108,518, balances due to other banks £75,061; average assets, £30,708,932, of which coin £5,053,882, bullion £150,385, landed property £425,398, notes and bills of other banks £264,099, balances due from other banks £52,066, notes and bills discounted and all other assets £24,763,102. The Bank of New Zealand is the most important institution and is semigovernmental in its nature. Four out of the six directors are appointed by the government, which is both a heavy shareholder and depositor. The notes of these banks are not legal tender, but can be made so for a limited time by a proclamation of the Governor. There are five private savings banks, which in 1914 had 74,120 depositors with £1,792,107 deposits. The Law of 1867, which established the Post Office Savings Bank, prohibited the organization of other private savings banks. Forty-six branches were established under the postal system in 1867, and in 1913 there were 724. The number of accounts increased from 2156 in 1867 to 458,594 in 1913, and the sum of deposits from £71,197 to £17,131,414. Nearly every family has an account. The public trustee does the work usually done in the United States by the private trust companies. Also the land registration offices compete with the private banks in holding real-estate mortgages. The high development of the coöperative spirit in New Zealand has also made the building societies and friendly societies successful. The governmental insurance system attracts a considerable amount of the people's savings.

Government. By order in council and by royal proclamation the style Colony of New Zealand was changed to Dominion of New Zealand Sept. 26, 1907. The legislative power is vested in the Governor and the General Assembly. The Governor is appointed by the crown and is assisted by a responsible ministry. The General Assembly consists of two Houses, the Legislative Council and the House of Representatives. Members of the former (42 in number in 1913) are appointed by the Governor for seven years. Two members of the council are aboriginals. Representatives (designated members of Parliament) are elected for three years. Four members represent native constituencies. The total number of electoral districts, each represented by one member, is 80. All registered adults of either sex who have resided one year in the colony and three months in the electoral district can vote. Women are not qualified to be elected as members of the House of Representatives. The administrative function is in the hands of the Governor, who has the power of veto over bills or can submit bills for consideration. He summons, prorogues, and dissolves Parliament. In 1865 the seat of government was changed from Auckland to Wellington. For purposes of local government the country is divided into counties and boroughs, road districts and town districts.

Finance. The participation of the government in industrial activities resulted in large annual receipts and expenditures and in a heavy debt. The gross revenue (excluding receipts from state coal mines) increased from £5,651,781 in the year ended March 31, 1900, to £9,339,961 in 1910 and £12,313,610 in 1914. The gross expenditure (excluding expenditure in respect of state coal mines) increased from £5,164,902 in the fiscal year 1900 to £8,994,568 in 1910 and £11,922,194 in 1914. In addition, expenditures from loans in the three years, respectively, were £993,223, £2,216,397, and £2,567,723. Customs receipts increased from £2,124,451 in 1900 to £2,700,928 in 1910 and £3,448,188 in 1914. The other important sources of revenue are railways, stamps, post and telegraph services, land tax, and income tax. The chief items of expenditure (exclusive of sums paid to the public-works fund) are the public-debt charges, railways, education, posts and telegraphs, and constabulary and defense. The total expenditure out of the public-works fund from 1870 to March 31, 1913, was £57,375,431. The outstanding public debt increased from £47,874,452 in 1900 to £81,078,122 in 1910 and £99,730,427 in 1914.

Defense. All the principal ports are defended by batteries, torpedo boats, and submarine mines. An Act of 1909, amended in 1910, provides for the gradual military training of males from 12 to 25 years of age, after which they will serve for five years in the reserve. The territorial force, which is organized in field and coast-defense units, is about 30,000 strong.

State Activities. New Zealand has become well known because of the various ways in which the functions of the state have been extended. The tendency in this direction was well developed prior to 1890, but became especially marked about that time. The movement has been the outgrowth largely of the influence exerted by organized labor upon legislation. The power of this element has been exercised through the existing political parties, and not through the agency of any politico-socialistic organizations such as have generally sought to advance radical movements in other countries. The experiment, for instance, has been made of preventing strikes and lockouts and adjusting questions at issue between labor and capital by compulsory conciliation and arbitration. Provisions are made by which either employers or trade unions may bring the dispute before a board of conciliation, and if a satisfactory agreement is not reached the question can be carried to the central court of arbitration. The decision made by this court is final and is enforced, the award against an association, however, being subject to a maximum limit of £500. In practice the plan has accomplished the purpose intended, strikes and lockouts having been greatly diminished. A number of other measures affecting labor have been carried into effect, such as factory inspection, prevention of child labor, specification of hours of labor, and the occurrence of holidays. A system of old-age pension provides that persons of good character who are not less than 65 years of age and have been 25 years in New Zealand may be pensioned if their income falls below specified limits.

Another phase of state activity receiving much attention has been the public-land policy. The attempt is being made to secure and retain the public ownership of the land, and freehold is gradually giving way to perpetual lease. The policy of compulsory purchase has resulted in the breaking up of many large holdings held largely for speculative purposes, and has secured a genuine settlement upon such lands. Ordinarily purchases are effected by friendly negotiations, and compulsion is not often necessary. In order to make a settlement and improvement of the land possible by persons of small means, the government advances loans to the settlers. The interest charged is 5 per cent. Between 1892 and 1907 a large proportion of the crownlands was disposed of on lease for 999 years. An Act of 1907 substituted a lease for 66 years (in the case of ordinary crownlands) and 33 years (in the case of settlement lands), with a perpetual right of renewal for further successive terms. The annual rental is 5 per cent on the cost price of the land, and there is at no time a right to purchase the freehold. "Settlement" lands are rented at 4½ per cent. District land boards have charge of the transfer of lands. The state has assumed the ownership of a number of utilities, including railroads, telegraphs, and telephones, and engages in banking and life, accident, and fire insurance. The results have been generally satisfactory. New Zealand has also taken an advanced position in regard to taxation. The Dominion property tax consists solely of a progressive land tax. The system exempts small farmers entirely. Local communities have the privilege also of restricting tax levies to their land values. There are progressive income and inheritance taxes. New Zealand has created the office of public trustee, whose incumbent has care of intestate estates, certain private trust estates, etc. Any property owner has the right of appointing him executor. A local-option law provides that licensed liquor houses may be abolished by a vote of three to two in any district, and that the number of them must be reduced if demanded by a majority of the electors. The question is voted upon every three years.

Population. The population of New Zealand, exclusive of Maoris, increased from 59,413 in 1858 to 414,412 in 1878, 626,658 in 1891, 772,719 in 1901, and 1,008,468 in 1911. In 1858 the North Island and Chatham Islands had 57.53 per cent of the population, and South Island and Stewart Island 42.47; in 1867, 36.63, 63.37 respectively; in 1901, 50.57 and 49.43; in 1911, 55.93 and 44.07. The Maoris numbered 41,993 in 1891, 43,143 in 1901, and 49,844 in 1911. The population by principal islands (and adjacent islets) according to the censuses of 1901 and 1911, with the additional Maori population in 1911, is shown below:

	Sq. m.	Pop. 1901	Pop. 1911	Maoris
North Island.....	44,467	390,571	563,729	46,632
South Island......	58,525	381,661	444,120	2,681
Stewart Island....	665	272	357	63
Total........	103,657	772,504	1,008,206	49,376
Chatham Islands..	375	207	258	219
Kermadec Islands.	13	8	4	......
Total........	104,045	772,719	1,008,468	*49,844

* Including 249 Maori wives living with European husbands and 4181 half-castes living as Maoris.

The area of the Cook and other annexed islands (not including Chatham and Kermadec) is stated at 705 square miles; the population in 1911 was 12,598, of whom 12,366 were natives and half-castes living as natives.

By provincial districts the population (exclusive of Maoris) is shown below for 1901 and 1911, with the density per square mile in 1911:

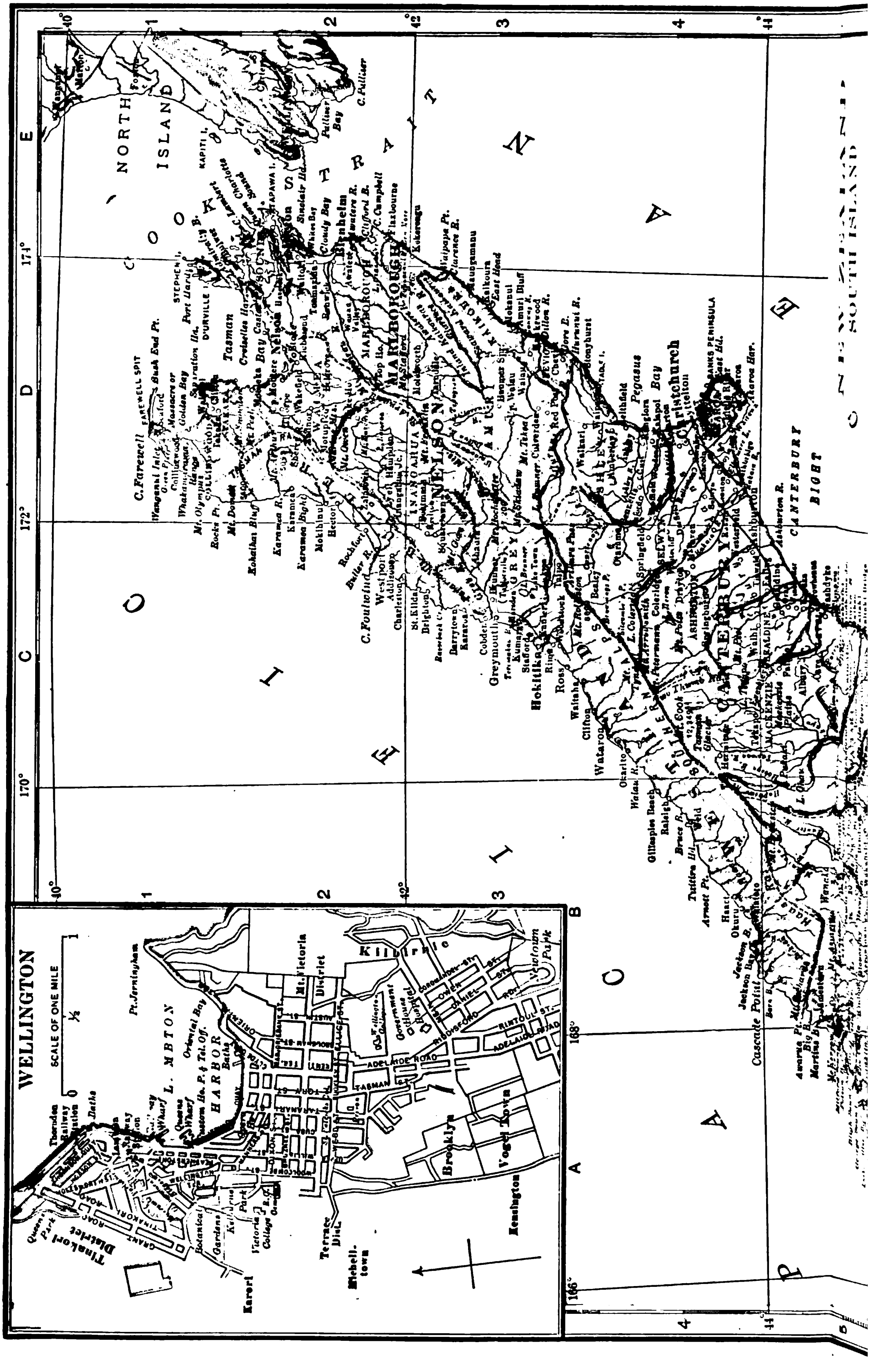
	Sq. m.	Pop. 1901	Pop. 1911	Density
North Island:				
Auckland.........	25,746	175,938	264,520	10.27
Taranaki.........	3,308	37,855	51,569	15.59
Hawke's Bay.....	4,410	35,427	48,546	11.01
Wellington.......	11,003	141,354	199,094	18.09
South and Stewart Islands:				
Marlborough.....	4,753	13,326	15,985	3.36
Nelson...........	10,269	37,915	48,463	4.72
Westland.........	4,641	14,506	15,714	3.39
Canterbury.......	14,040	143,041	173,185	12.34
Otago:				
Otago portion...	14,313	125,341	132,402	9.25
Southland " *..	11,174	47,804	58,728	5.26
Chatham Islands....	375	207	258	0.66
Kermadec Islands...	13	8	4	0.31
Total..........	104,045	772,719	1,008,468	9.69

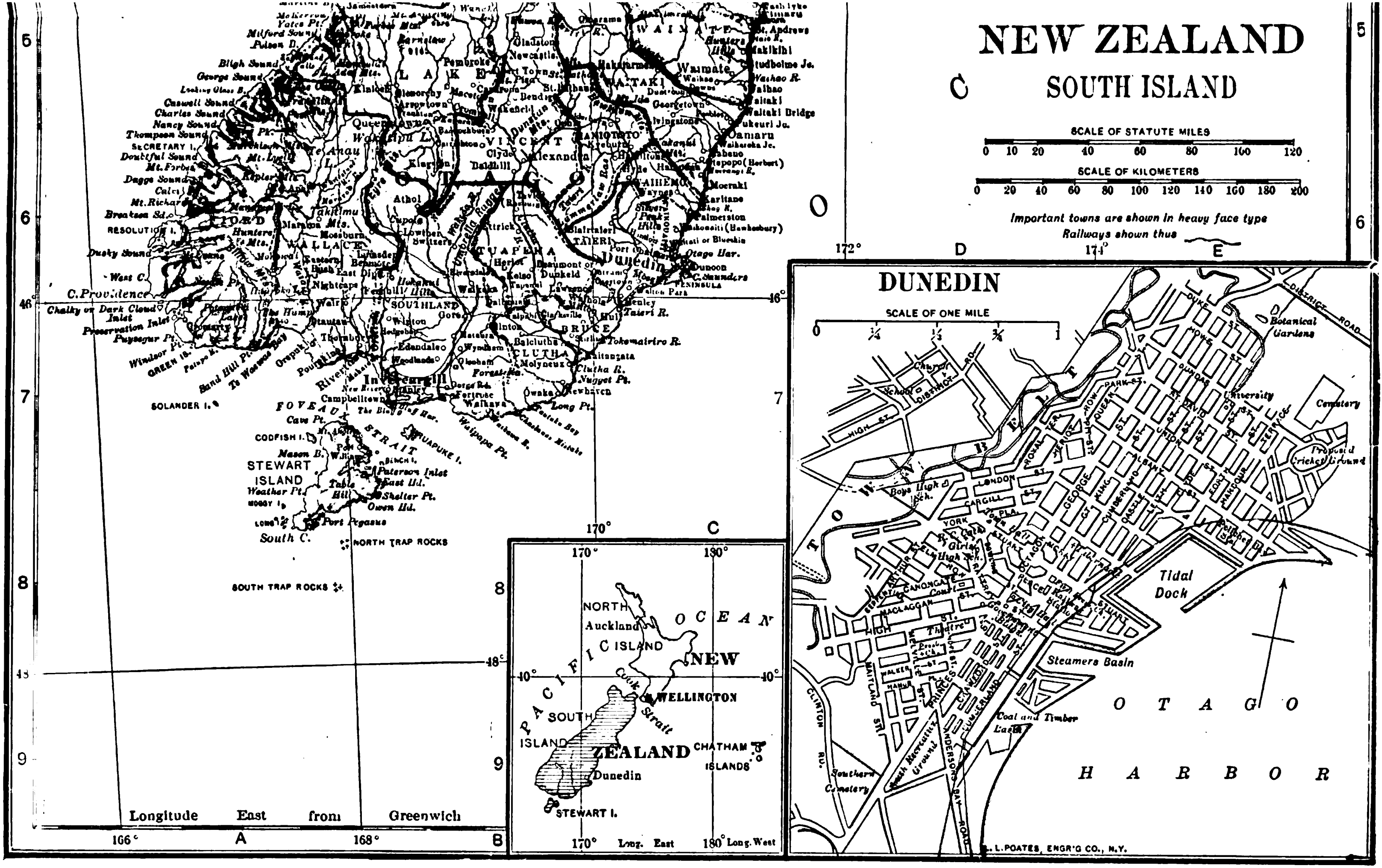
* Includes Stewart Island.

From 1896 to 1901 the population (exclusive of Maoris) increased 9.86 per cent; from 1901 to 1906, 14.99 per cent; from 1906 to 1911, 13.49 per cent. The population is very homogeneous, deriving almost wholly from the United Kingdom. The percentage of persons born in New Zealand was 69.74 in 1911; and in the United Kingdom or British possessions, 97.92. In 1912 the birth rate was 26.48; death rate 8.87; marriage rate, 8.81. Excess of births over deaths, 18,294; immigrants, 44,660; emigrants, 35,733; excess, 8927. The 1911 census population of the larger towns is as follows: Wellington, 64,372 (with suburbs 70,729); Christchurch, 53,116 (80,193); Dunedin, 41,529 (64,237); Auckland, 40,536 (102,676); Invercargill, 12,782 (15,858); Timaru, 11,280; Palmerston North, 10,991; Wanganui, 10,929; Napier, 10,537; Gisborne, 8196; Nelson, 8051.

Religion. In 1911 adherents of the Church of England (and Protestants undefined) numbered 413,842 (41.14 per cent of the population, exclusive of Maoris); Presbyterians, 234,662 (23.33); Roman Catholics (and Catholics undefined), 140,523 (13.97); Methodists, 94,827 (9.43); Baptists, 20,042 (1.99); Salvation Army, 9707 (0.96); Congregationalists, 8756 (0.87). Jews numbered only 2128.

Education. The public system of education is in charge of a government department, with a minister at its head. School attendance is compulsory between the ages of seven and fourteen. The schools are secular and the primary grades are free, small fees being charged for secondary courses. At the end of 1912 there were 2214 public primary schools, with 4723 teachers, and 166,264 pupils enrolled; 310 private schools (mainly Roman Catholic), with 986 teachers and 20,238 pupils; 108 government native village schools, with 236 teachers and 4694 pupils. In secondary schools were over 9100 students. Besides a number of art schools, there are mining, agricultural, and engineering institutions. In 1912–13 the state expended £1,334,599 on education. The New Zealand University is an examining body, which has four affiliated colleges located respectively at Dunedin, Christchurch, Auckland, and Wellington. Each of these has the advantage of land grants, the income from which is annually supplemented by parliamentary grants.


WELLINGTON
SCALE OF ONE MILE
LAMBTON HARBOR
Kilbirnie
Brooklyn
Vogel Town
Newtown Park
Kensington
Karori
Tinakori District
NORTH ISLAND
COOK STRAIT
NELSON
MARLBOROUGH
WESTLAND
CANTERBURY
Christchurch
Pegasus Bay
CANTERBURY BIGHT
Blenheim
Kaikoura
Hokitika
Greymouth
Westport
C. Farewell
C. Foulwind
C. Palliser
Mt. Cook
BANKS PENINSULA
PACIFIC OCEAN
NEW ZEALAND SOUTH ISLAND
40°
42°
44°
166°
168°
170°
172°
174°
A
B
C
D
E
1
2
3
4


NEW ZEALAND
SOUTH ISLAND
SCALE OF STATUTE MILES
0 10 20 40 60 80 100 120
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Important towns are shown in heavy face type
Railways shown thus
DUNEDIN
SCALE OF ONE MILE
0 ¼ ½ ¾ 1
Botanical Gardens
Cemetery
University
Proposed Cricket Ground
Tidal Dock
Steamers Basin
Coal and Timber Lasts
Southern Cemetery
OTAGO HARBOR
DISTRICT ROAD
CLINTON RD.
ANDERSONS BAY ROAD
MAITLAND ST.
HIGH ST.
PRINCES ST.
GEORGE ST.
CUMBERLAND ST.
STUART ST.
LONDON ST.
CARGILL ST.
YORK PL.
TOWN BELT
Boys High Sch.
Girls High Sch.
Theatre
Railway Station
NORTH ISLAND
Auckland
PACIFIC OCEAN
NEW ZEALAND
WELLINGTON
Cook Strait
SOUTH ISLAND
Dunedin
STEWART I.
CHATHAM ISLANDS
170° 180° Long. East Long. West
40°
Milford Sound
Bligh Sound
George Sound
Caswell Sound
Charles Sound
Nancy Sound
Thompson Sound
SECRETARY I.
Doubtful Sound
Dagg Sound
Breaksea Sd.
RESOLUTION I.
Dusky Sound
West C.
C. Providence
Chalky or Dark Cloud Inlet
Preservation Inlet
Puysegur Pt.
Windsor Pt.
GREEN IS.
Sand Hill Pt.
Te Waewae Bay
SOLANDER I.
FOVEAUX STRAIT
CODFISH I.
STEWART ISLAND
Paterson Inlet
Port Pegasus
South C.
NORTH TRAP ROCKS
SOUTH TRAP ROCKS
RUAPUKE I.
LAKE
Queenstown
Wakatipu L.
Te Anau L.
Manapouri
WALLACE
SOUTHLAND
Invercargill
Bluff Har.
Riverton
Gore
Winton
Mataura
Wyndham
Balclutha
CLUTHA
BRUCE
Milton
TUAPEKA
Lawrence
Roxburgh
Alexandra
Clyde
VINCENT
Cromwell
Arrowtown
MANIOTOTO
Naseby
Kyeburn
TAIERI
Mosgiel
Dunedin
Port Chalmers
Otago Har.
PENINSULA
Waikouaiti
Palmerston
Hampden
Moeraki
Oamaru
WAITAKI
Kurow
Georgetown
Duntroon
Waimate
St. Andrews
WAIMATE
Taieri R.
Tokomairiro R.
Clutha R.
Nugget Pt.
Owaka
Long Pt.
Waipapa Pt.
Catlins R.
Longitude East from Greenwich
166° 168° 170° 172° 174°
46° 48°
A B C D E
5 6 7 8 9
O
L. POATES, ENGR'G CO., N.Y.

History. New Zealand was discovered by Tasman in December, 1642. In October, 1769, Captain Cook landed at Poverty Bay and in 1773 and 1777 explored the shores of the islands. The period before European colonization was characterized by fierce wars among the native tribes, marked by extensive conquests on the part of the celebrated chieftain Hongi (1820–28). In 1814 Rev. Samuel Marsden established a mission in the Bay of Islands. Other missionaries rapidly followed, and the natives were speedily converted to the outward forms of Christianity. A British resident was appointed at the Bay of Islands in 1833, and in the following year British troops were employed against the natives. In September, 1839, an expedition, under the auspices of the New Zealand Company, arrived at Port Nicholson, the first body of immigrants reaching that place in January of the following year. In February a number of native chiefs, by the Treaty of Waitangi, placed themselves under the authority of the British government, and in May the sovereignty of Great Britain over the islands was proclaimed. Colonization was rapid, and the alienation of the Maori lands proceeded steadily. In 1850 the New Zealand Company surrendered all of its interests in the colony to the British government, and in 1853 a constitutional act was promulgated for the colony, the first representative assembly being opened in 1855. From 1860 to 1866 there were formidable native uprisings, and spasmodic outbreaks did not cease until about 1870. Since that date the relations with the native population have been almost uniformly peaceful, and the Maoris have made rapid strides in civilization, attaining even a share in the government. In 1870 an act was passed establishing the New Zealand University. About this time, too, occurs the beginning of the policy of state participation in economic affairs, with the commencement of railway construction under public supervision in 1871 and the establishment of a Public Trust Office in 1872. An educational act providing for the free and compulsory instruction of all children was passed in 1876. In 1879 a measure was enacted looking towards the establishment of manhood suffrage, although the one-man one-vote principle was not in complete operation until 1890. In September, 1893, the franchise was extended to women.

New Zealand, as an experiment station in social reform, is one of the most interesting countries in the world of to-day. In that small group of islands radical legislation in regard to the relations of capital and labor and the ownership of land have been enacted, state control has been extended over many branches of industry. State socialism began in a moderate way in 1881, when the crownlands were offered on a perpetual lease with right of purchase; in 1886 a Factory Act was enacted, and in 1889 plural voting was abolished.

The railways are owned and operated by the government, and they are not run for a profit, but for public convenience. Some of the coal mines are owned and operated by the state, and stations are established throughout the island for the sale of such coal. The water power of rivers and streams is owned in perpetuity by the state, and the government also owns and operates telephones and telegraphs.

The government of New Zealand is a money lender. It grants loans to counties and municipalities for construction of public works, and also to individuals in particular cases. In 1906 the Government Advances to Workers Act was enacted, according to which money is loaned to workers at 4½ per cent and 5 per cent. In 1905 the Workers Dwelling Act provided for building of houses to rent at a rental of 5 per cent of capital cost plus insurance.

In industrial and labor legislation New Zealand has also made radical experiments. Labor legislation goes as far back as 1875, when the Employment of Females Act was enacted, prohibiting the employment of women in night work and for more than eight hours a day.

New Zealand is particularly famous for its Arbitration and Conciliation laws. The first was passed in 1894 and amended in 1908 and again on Dec. 15, 1914. (See LABOR AND CAPITAL.) As a result of this act New Zealand became known as the "country without strikes"; nevertheless, strikes have been numerous. A Labor Unity Congress gave birth to two new organizations—the Social Democratic party and the United Federation of Labour. The former demands a "Right to Work" law providing for a minimum wage and a maximum working day of six hours; also the noninterference of the army in industrial disputes. As a result of a general strike in 1913, the government introduced an amendment to the arbitration law punishing disobedience to the acts of the Arbitration Board by a fine of £10 for each employee and £500 for each employer. The Labor party has been split into two camps—one based on the ideas of syndicalism, the other on political opportunism.

The most momentous question in New Zealand is that of the exclusion of Asiatic immigration. The Chinaman is an object of genuine race hatred and is considered an economic menace. The Chinese Restriction Act of 1896 provided for a Chinese immigration tax of £100 per head; that the number of Chinese immigrants be limited to one for every 200 tons of each ship coming to the colony; that captains and shipowners evading the act should be liable to severe penalties. This law has been rigorously enforced. The Labor party has been opposed to all immigration. In 1899 a law was passed compelling every immigrant to show that he has a capital of £100 plus £50 for every member of his family more than 12 years of age. The Immigration Restriction Act of 1908 prohibits the immigration of any one who is unable to write and sign in any European language a prescribed form of application. The Minister of Marine introduced into the House a bill, June 30, 1914, to restrict the right of entry to Hindus and other Asiatics within the Empire who could not write an application of not less than 50 words in a European language.

New Zealand is more strongly in favor of Imperial Federation than any other British colony or dependency. Premier Seddon, as the representative of his colony at the second Jubilee of Queen Victoria in 1897 and at the coronation of King Edward in 1902, voiced its strong belief in Imperial Federation. This colony rendered strong support to the British Empire during the South African War, its contingent of 6000 men constituting a higher proportion than that of any other British colony. A Defense Bill was passed in December, 1910, providing for elementary military training for all boys between the ages of 12 and 18; those between the ages of 18 and 21 are to have compulsory training on stated evenings and four days annually in camp. During the Great European War which began in 1914, New Zealand, as in the South African War, furnished more than its share of the British forces. (See War in Europe.) Early in 1913 New Zealand built for the Imperial navy a battle cruiser bearing the name of the Dominion itself.

In 1890 Sir John Balance became Premier, through the entry into politics of laboring men combined with members of the middle class, and remained in power until 1893. From 1893 until his death, in 1906, Richard John Seddon was the dominant personage in New Zealand political life. It was during his premiership that the largest share of radical legislation was enacted by the New Zealand government. Seddon's party continued in power after his death in 1906 under the leadership of Sir Joseph Ward; survived the election of 1908; was disastrously crippled in the election of 1911 and finally broken up in the election of 1912. The Labor party until recently had been kept in power by the combination of the small landowners and the labor unions. The former have become wealthy and are becoming more conservative; the latter feel that this combination is not gaining for them what they desire, and as a result this party is becoming much more class conscious than formerly. The laboring class has become strongly opposed to compulsory arbitration, while the industrial leaders are becoming its strongest advocates. See Old-Age Pensions.

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NEW ZEALAND FLAX. See Flax, New Zealand.

NEW ZEALAND SUBREGION. In the Sclater-Wallace system of zoögeography, a subregion of the Australian Province, including New Zealand and all the surrounding islands south of New Caledonia. Its faunal characteristics are delineated in the article New Zealand, paragraph *Fauna*. Other views have been held in regard to the faunal relations of this isolated archipelago. Huxley made it a primary subdivision of his hemispherical region "Notogæa" (q.v.). Recent zoölogists have been inclined to consider its features so distinct as to elevate it to primary rank and make it a full "region," coördinate with the Australian and other "provinces." See Distribution of Animals.

NEXT FRIEND. An adult person, other than a guardian *ad litem*, who represents in an action another person who, by reason of infancy or other disability, is not legally competent to maintain the suit in his own behalf. The practice of permitting an incompetent person to sue by his next friend originated in England, where it was first authorized by the Statute of Westminster passed in the reign of Edward I. Previous to that time an action in favor of an infant or other incompetent person could only be conducted by his regularly appointed guardian. The Norman-French term *prochein ami*, of which "next friend" is the English equivalent, was employed in the above statute, and continues in use in many jurisdictions to-day. There is very little difference between the functions of a guardian *ad litem* and a person who sues as next friend, except that the latter usually represents a plaintiff, and in some jurisdictions the former is only appointed to represent a defendant.

A next friend is not a party to an action, but acts solely in a representative and advisory capacity. It follows, therefore, that most of the rules governing parties, as that the admissions of a party bind him, etc., do not apply to a next friend. He is, however, subject to such rules as relate to the conduct of the case. A next friend is considered an officer of the court where he is appointed to protect the interests of an incompetent defendant. In some States where an infant is otherwise represented by a guardian, he may sue by a next friend to compel an accounting by the guardian where there is reason to believe that the latter is guilty of a breach of trust. In a few jurisdictions married women and persons of unsound mind may sue by a next friend. Usually, however, lunatics and those who are mentally incompetent are represented by committees or guardians. An action commenced by a next friend cannot be discontinued or settled without the consent of the court. A next friend only represents the incompetent during the litigation, which, however, is not considered as ended until an appeal is determined or the right to appeal has expired. See Committee; Guardian; Infant; Lunatic; Husband and Wife; Marriage; Parties; and authorities referred to under those titles.

NEXT OF KIN. See Kin, Next of.

NEY, nā, Michel, Duke of Elchingen and Prince of the Moskva (1769–1815). One of Napoleon's most celebrated marshals. He was born Jan. 10, 1769, at Saarlouis, the son of a poor cooper. He had but little education and worked as clerk to a notary and as foreman in a mine until 1788, when he joined a hussar regiment at Metz. He made the campaign of 1792 with the Army of the North and rose to be lieutenant. In April, 1794, he became captain in the Army of the Sambre and Meuse, and distinguished himself by his energy and his cool intrepidity. He was wounded at the siege of Mainz, fought bravely in 1795 at Altenkirchen, and for his services in storming the citadel of Würzburg and forcing the passage of the Rednitz was made in 1796 brigadier general. His capture of Mannheim (March 28, 1799) gained him the rank of general of division, and after being severely wounded at Winterthur in May, he was placed in September in temporary command over the Army of the Rhine, and carried on a skillful game of strategy against the Archduke Charles of Austria, whom he prevented from uniting with Suvarov against Masséna. He fought subsequently under Lecourbe and Moreau at Engen, Moöskirch, and Hohenlinden. Ney's republican principles could not withstand the blandishments of Napoleon, who made him inspector general of cavalry, and sent him on a diplomatic mission to Switzerland, where he brought about the Act of Mediation of February, 1803. In the same year he received command of the Sixth Corps of the Grand Army raised for the invasion of England, but soon to be turned against Austria. In 1804 he was made a marshal of the Empire. In the following year he defeated the Austrians at Günzburg (October 9) and by his successful assault on the intrenchments of Elchingen brought about the capitulation of Ulm and gained for himself the ducal title (conferred in 1808). He fought at Jena in 1806, reduced the cities of Erfurt, Magdeburg, and Thorn, and by his timely arrival on the battlefield of Eylau (q.v.) prevented a possible defeat for the French. On June 14, 1807, Ney took the village of Friedland from the Russians after a bloody combat, and thus decided the outcome of the battle. He now became the idol of the army, while Napoleon bestowed on him the title of *Brave des braves.* In 1808 he was sent with the Sixth Corps to Spain, where he maintained an energetic warfare against the Spanish guerrillas and added to his reputation for audacity and skill. In 1810 he was placed under the command of Masséna, to whom was intrusted the invasion of Portugal. Ney resented what he conceived a slight towards himself, and, though he fought with splendid courage on the retreat from Torres Vedras as commander of the rear guard (one of the greatest incidents in his career), he was guilty of gross insubordination, and in March, 1811, returned to France in semidisgrace. His talents, however, made him invaluable, and in the Russian campaign (1812) he held command of the Third Corps. He distinguished himself at Smolensk and commanded the centre at Borodino (q.v.), where his efforts achieved the victory, his services being rewarded with the title of Prince of the Moskva. He commanded the rear guard on the retreat from Moscow, and by vigorous discipline and devoted heroism saved the remnants of the Grand Army from utter disorganization, notably at the disastrous passage of the Beresina. In the campaign of 1813 he won a victory over the Allies at Weissenfels (May 1, 1813), fought at Lützen and Bautzen in May, but was defeated by Bülow at Dennewitz (September 6). He held the left of the French line in the battles around Leipzig and was with Napoleon in the defensive campaign of 1814 in France. After the taking of Paris by the Allies he insisted on Napoleon's abdication and hastened to offer his services to the Bourbons. He was made a peer of France, and a member of the council of war, and was placed in charge of the sixth military division. On news of Napoleon's return from Elba he was ordered to Besançon to resist the Emperor's advance, but on the night of March 13 he went over to Napoleon, summoning his troops to follow him, and on the 17th he joined the Emperor at Auxerre, moved to this act, no doubt, by the magic influence of his old commander, but influenced too by the humiliations to which he had been subjected by the returned nobles of the old régime. At the head of the First and Second Corps of the new army raised by Napoleon, he fought on June 16 at Quatrebras (q.v.), and led the last charge of the Old Guard at Waterloo. After the battle he returned to Paris and advocated the recall of the Bourbons. Proscribed on July 24, he remained in hiding in the country till August 5, when he was discovered and brought to Paris and arraigned (December 5) before a court-martial containing many of his old companions in arms. The court declared Ney out of its jurisdiction as a peer of France, and handed him over to the Chamber of Peers, which on Dec. 6, 1815, by 139 votes against 17 found him guilty of treason and condemned him to death. He was shot the following day in the gardens of the Luxembourg. There is a persistent rumor, which has never been authenticated, however, that Ney escaped from Paris and fled to North Carolina, where he taught school and gave fencing lessons. Consult: Evariste Dumoulin, *Histoire complète du procès du maréchal Ney* (2 vols., Paris, 1815); Henri Welschinger, *Le maréchal Ney, 1815* (2d ed., ib., 1893); C. H. L. Johnston, *Famous Cavalry Leaders* (Boston, 1908); Henri Bonnal, *La vie militaire du maréchal Ney* (Paris, 1910).

NEYMARCK, nā'märk', Alfred (1848–). A French economist, born at Châlons. He was at various times president of the Statistical Society, vice president of the Society of Political Economy, and a member of many commissions investigating social and economic questions. In 1904 he was a delegate to the St. Louis World's Fair. Neymarck was created a Commander of the Legion of Honor. He wrote: *Répartition de l'épargne; La statistique internationale des valeurs mobilières* (a number of reports); *La France se ruine-t-elle?* (1901); *Les valeurs mobilières en France* (1903); *L'Année de l'entente cordiale et de l'arbitrage* (1904); *La banque de France de 1880 à 1905* (1905); *L'Obsession fiscale* (5 vols., 1902–07); *Que doit-on faire de son argent?* (1913).

NEZHIN, nyĕ′zhĕn, or **NEJIN**. A town in the Government of Tchernigov, Little Russia, situated on the Oster, about 80 miles northeast of Kiev (Map: Russia, D 4). It has a philological institute, a Gymnasium, and a Greek school. It is noted for the tobacco cultivated in its vicinity. Vegetables and fruit are also important products. The trade, formerly of great extent, has decreased since the rise of Taganrog and Rostov-on-the-Don. It was under Chmielnicki, in the seventeenth century, that Greek merchants settled at Nezhin, where they received special privileges. Pop., 1897, 32,100; 1910, 51,905, including a number of Greeks.

NEZ PERCÉ, nȧ pâr′sȧ′. The leading tribe of Shahaptian stock (q.v.). They call themselves Numipu, but are called Shaphatin by their Salish neighbors, whence the stock name. Lewis and Clark obtained the name *Chopunnish* from some unknown source. The modern name *Nez Percé* (pierced nose) was given them by the French, in allusion to their former custom of wearing nose pendants. They formerly claimed a large territory in eastern Washington and Oregon and central Idaho, bounded on the east by the main divide of the Bitter Root Mountains and including the lower Grande Ronde and Salmon rivers, with a large part of the Snake and all of the Clearwater River districts.

Lewis and Clark traversed their country in 1805. In 1832 the tribe sent a delegation to St. Louis to ask for Christian missionaries and teachers. In response to their request a Protestant mission was established among them at Lapwai, Idaho, in 1837. Soon afterward they entered into governmental relations, and they made their first treaty with the United States in 1855. By this they ceded the greater portion of their territory and were confirmed in the possession of a reservation including Wallowa valley in Oregon. On the discovery of gold in the country, however, the miners rushed in, and in consequence a new treaty was forced upon the Indians by which they agreed to surrender all but a reservation at Lapwai in Idaho. Joseph, who occupied Wallowa valley with his band, refused to recognize the treaty or remove to Lapwai. This refusal led to the Nez Percé War in 1877, in which, under Joseph's leadership, several severe defeats were inflicted upon successive detachments of regular troops. Joseph finally almost accomplished a masterly retreat towards Canada through Idaho and Montana, which was frustrated only by the arrival of Colonel (General) Miles, when the Indians were within 50 miles of the British line. Joseph surrendered on assurance of being allowed to return to his own country, but the promise was not kept. He and his band were deported to the Indian Territory, where in seven years they were reduced by disease from about 450 to 280. Their condition compelled attention, and in 1884 they were returned to the north, not, however, to their old country, but to the Colville reservation in northern Washington, where they now reside. From an estimated total population of 2800 in 1863 the tribe has decreased to less than 1300, of whom about 1000 are on the (allotted) Lapwai agency, in northwestern Idaho, the rest at Colville, Wash. The Nez Percé tribe was divided into 40 or more bands, each with regular camping sites along the river banks where they lived in winter. At the summer camps in the mountains and on the great upland camas meadows many bands came together. Their houses were made of mats and skins and were often of large size. No agriculture was practiced, the food being game, fish, roots, and berries. After obtaining horses the Nez Percé made trips after buffalo. Their sociologic and religious development was poor. Marriage was generally outside of the village group. The principal religious ceremony was the Guardian Spirit dance, but war dances of various sorts were copied after from the Plains Indians. In art these people are transitional between the Columbia River types where weaving was developed and the Plains types where buffalo skins were decorated with paint and porcupine quills. The power of the chiefs depended upon personal popularity alone. In physique the Nez Percé are splendid specimens of manhood, many standing well over 6 feet in height and strongly built. Consult: James Mooney, "Ghost Dance Religion," in *Fourteenth Annual Report of the Bureau of Ethnology* (Washington, 1893); K. C. McBeth, *The Nez Percés since Lewis and Clark* (New York, 1908); H. J. Spinden, "The Nez Percé Indians," in *Memoirs of the American Anthropological Association*, vol. ii (Lancaster, Pa., 1911); O. H. Lipps, comp., *Laws and Regulations Relating to Indians and their Lands* (Lewiston, Idaho, 1913). See Plate of American Indians, under Indians.

NGAMI, n'gä′mė, Lake. A lake in south-central Africa, situated in the Bechuanaland Protectorate, north of the Kalahari Desert (Map: Cape of Good Hope, F 3). It is one of the last remnants of the great inland sea which formerly seems to have occupied the vast lacustrine basin of which the Kalahari is a part. A gradual desiccation is still going on in this region, and Lake Ngami has diminished considerably since it was discovered by Livingstone in 1849. It is now little more than a marsh in the dry season, while during floods it may reach the dimensions of 10 by 30 miles, but the water is soon lost by evaporation and underground drainage. It receives the waters of the Kubanga and discharges periodically eastward into the Makarikari Salt Basin.

NGANHWEI, n'gän′hwā′ĕ, or Anhwei (Chin., peace, plenty). One of the eastern provinces of China, bounded on the north by the Province of Kiangsu, on the east by Kiangsu and Chekiang, on the south by Kiangsi, and on the west by Hupeh and Honan (Map: China, L 5). Its area is estimated at 54,826 square miles. It is divided into three parts—the hilly region in the south around Hweichow and Ningkwoh with the Tsientang River, the central plain of the Yang-tse, and the northern part, drained by the river Hwai. The southern districts are famed for climate, fertility, and productions. The staples are fruits, tea, rice, cotton, hemp, silk, and iron. The province produces great quantities of the Chinese ink known as "India ink." The numerous streams are used for navigation and for irrigation, their control showing great engineering ability. There is much coal, as yet unworked to any great extent. Opium was formerly grown considerably, but is rapidly being reduced. The province contains some of the most productive and beautiful parts of the country and is under a high state of cultivation. It suffered greatly in the Taiping Rebellion, losing nearly half its population. In 1910 the population, according to the Chinese Michengpu census, was placed at 17,300,000, and by the customs estimate at 36,000,000. The capital is Nganking, or Anking (q.v.). Wuhu (q.v.) is an open port. Fengyang is celebrated as the birthplace of the founder of the Ming dynasty, and the town of Hofei as the birthplace of the great Viceroy Li Hung Chang.

NGANKINGFU, n'gän′king′fo͞o′, or Nganking; also spelled Anking. The capital of the Province of Nganhwei or Anhwei (q.v.), China, situated on the Yang-tse River, about 175 miles east of Hankow (Map: China, L 5). It still shows traces of its occupation during the Taiping Rebellion, when the rebels held it for seven years. It was opened to foreign trade in 1897, as a port of call for the Yang-tse River steamers. There are a military college and a provincial mint. Pop., 40,000.

NGORNU, n'gôr′no͝o, or **ANGORNU**, ȧn-gôr′no͝o. A town of Bornu, Central Africa, on the southwest bank of Lake Chad, 15 miles southeast of Kuka. Owing to its low position, the town is occasionally flooded by the rising waters of the lake. Ngornu is an important commercial place, and through its fairs an extensive trade is carried on in cotton, amber, and metals. Its population is estimated at from 20,000 to 50,000.

NIAG′ARA, Battle of. See Lundy's Lane, Battle of.

NIAGARA FALLS. See Niagara River and Falls.

NIAGARA FALLS. A city and port of entry in Niagara Co., N. Y., 22 miles by rail north by west of Buffalo, on the Niagara River and on the Erie, the Michigan Central, the Lehigh Valley, the New York Central and Hudson River, the West Shore, the Wabash, and other railroads (Map: New York, A 4). It is the seat of Niagara University (Roman Catholic), opened in 1856, and De Veaux College (Protestant Episcopal) and has a $200,000 high-school building and 12 modern grade schools, a public library, for which a $50,000 building was given by Andrew Carnegie, the Niagara Falls Memorial Hospital, Mount St. Mary's Hospital, and a Federal building. The New York State Reservation here, which includes Prospect Park, is 107 acres in extent; and there are three notable bridges connecting with Canada—one cantilever and two steel arch bridges. (See Bridge.) The vicinity possesses much of historic interest. Niagara Falls, long noted as the foremost scenic resort of America, has developed also into an important manufacturing centre, its growth being due to the utilization of the extraordinary power of the Niagara River and Falls (q.v.). Among the many and diversified industrial establishments are flour and paper mills, planing mills, foundries and machine shops, a plant for the production of wheat biscuit, electric car heaters and car-lighting systems, aluminium, carbide, graphite, carbon, and carborundum works, electrometallurgical and electrochemical works. Notable work in city building has been accomplished, including the construction of 80 miles of sewers, at a cost of $1,400,000, the installation of a $1,000,000 water-supply system, and the laying of 48 miles of brick and asphalt pavement. The growth of the city has been rapid, and as a customs district it has achieved considerable importance, the value of trade in 1913 amounting to more than $42,000,000, including exports to the amount of $36,000,000. Niagara Falls was chartered as a city in 1892, the former villages of Niagara Falls and Suspension Bridge being consolidated. The government is vested in a mayor and four commissioners, who appoint a city manager. The water works are owned and operated by the municipality. Pop., 1900, 19,457; 1910, 30,445; 1915 (State census), 42,433.

NIAGARA FALLS, formerly Clifton, or Suspension Bridge. A city of Welland County, Ontario, Canada, on the west bank of Niagara River, below the falls, 24 miles north-northwest (direct) of Buffalo, and on the Grand Trunk, Michigan Central, Canadian Pacific, New York Central, and other railways (Map: Ontario, F 7). It is opposite Niagara Falls City, U. S., with which it is connected by three bridges and electric railways, and is the junction of the main lines of railways entering that city with the Grand Trunk Line of Canada. Its chief features are Wesley Park, Niagara Glen, and Queen Victoria Niagara Falls Park, which covers an area of 154 acres, extends along the river for 2½ miles, and commands the finest views of the falls. The manufactured products include cereal foods, graphite, cyanide, hosiery, hats, silverware, electrochemical products, carpet sweepers, foundry and machine-shop products, aluminium novelties, paper boxes, suspenders, etc. Extensive hydroelectric works have been constructed with a capacity of 450,000 horse power. Pop., 1901, 4244; 1911, 9248; 1915 (local est.), 11,850.

NIAGARA-ON-THE-LAKE. A town in Lincoln County, Ontario, Canada, on Lake Ontario, at the mouth of the river Niagara, 34 miles distant by water from Toronto, and on the Michigan Central and the Niagara, St. Catherines, and Toronto railroads (Map: Ontario, F 6). Steamers ply daily between Lewiston, Niagara, and Toronto, and in summer the tourist traffic is large. Pop., 1901, 1258; 1911, 1318. Burned down in December, 1813, by the American general, McClure, on his retreat, it was rebuilt, and became highly popular as a summer and pleasure resort. It was formerly called Newark and was the capital of Upper Canada (Ontario). It contains Navy Hall, the official residence of Lieutenant Governor John Graves Simcoe (q.v.) in 1791, and the ruins of Fort George and of Fort Missasauga. A few miles distant are Queenston and Queenston Heights, the latter the scene of an American defeat in the War of 1812. Consult M. A. Fitzgibbon, *A Trip to Niagara* (Toronto, 1909).

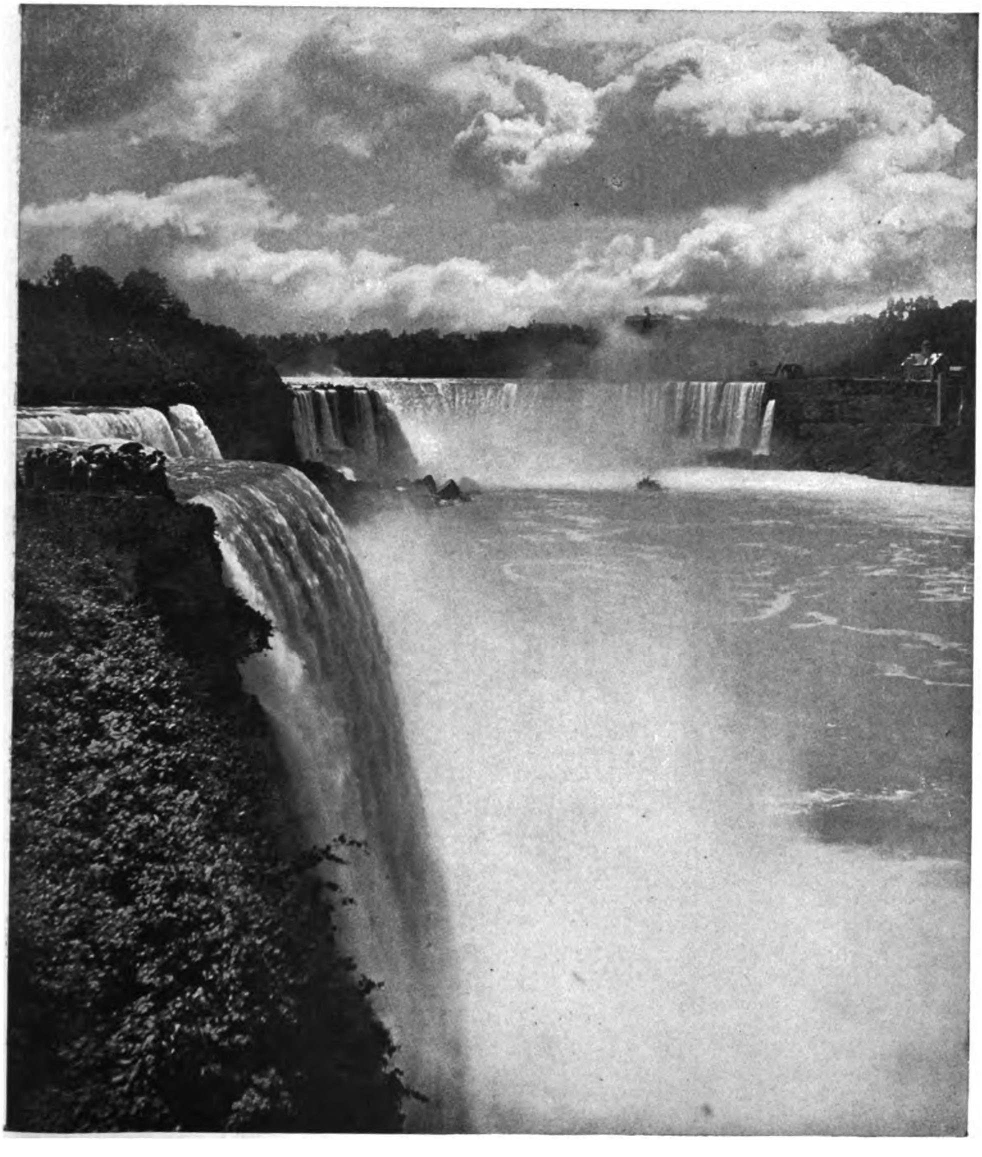
NIAGARA RIVER AND FALLS (Iroquois *Jorakare*, thundering water). The river flowing from Lake Erie to Lake Ontario and the outlet for the whole drainage of Lakes Superior, Huron, Michigan, St. Clair, and Erie (Map: New York, A 4). The surface of Erie, where the river begins, is 326 feet higher than the level of Ontario, where it ends. The river is 33 miles long, its general direction is from south to north, and it forms the boundary between New

York State and the Canadian Province of Ontario. The volume of water which enters Niagara is 280,000 cubic feet a second. In its upper course the river is very wide (below Grand Island from 2½ to 3 miles); just above Niagara Falls it is less than a mile in width, and below the falls it rushes headlong through a deep and narrow gorge to the cliff at Lewiston, where it emerges on the plain of Lake Ontario and is again a broad and peaceful river.

As it emerges from Lake Erie and enters the plain, it is crossed by a low ridge of rock, in passing which the river is swift and troubled for about 2 miles. Then it is smooth again, flows slowly over the plateau, has an average depth of 25 feet, and its surface is interspersed with many small islands. For nearly three-fourths of its length it cannot be said to have a valley, for it flows upon the surface of the plateau, and its fall from the lake to the rapids above the cataract is only 20 feet. Then a sudden and complete change in its aspect occurs. It is dropped by the short rapids beginning a little above Goat Island 52 feet, which is the prelude to the fall over the majestic cataract, where it plunges 160 feet down into the plain, a total descent of 212 feet from the head of the rapids. The Niagara River gorge proper begins at the brink of the Horseshoe Falls and extends in a zigzag course to the escarpment at Lewiston, a distance of 7 miles as the river flows. The gorge is divisible into four sections. The uppermost, sometimes called the Upper Great Gorge, is nearly straight and extends from the Horseshoe Falls almost to the railroad bridges, a distance of 2¼ miles. The next section, a little more than 1 mile long, attains the Whirlpool. The third has a length of 2 miles and ends at the bend opposite Niagara University. Here the last section begins, to end at Lewiston, a distance of 1¾ miles. At the foot of the American Falls there is no great depth of water, massive and broken rock in the bed having prevented the deep excavation that would otherwise occur; but the enormous mass of water, 20 feet deep at the centre and about nine-tenths of the whole volume, which thunders over the Canadian or Horseshoe Falls, has excavated a basin extending from shore to shore for 1½ miles below the falls that is fully as deep as the height of the falls. The effect of this deep basin or reservoir is to retard and smooth the waters so far that rowboats cross the river and the little steamer *Maid of the Mist* is able to approach the cataract. The basin is succeeded by the narrow gorge which continues to Lewiston, its width rarely equaling one-fourth of a mile, and its depth to the bottom of the river varying from 200 to 500 feet. Its walls are so steep that they can be climbed only at a few places, and they reveal the geologic structure of the plateau—the bedded rocks of limestone, shale, and sandstone lying almost horizontally. The fall of the river in the gorge, 7 miles long, is about 100 feet. The confined waters pour tumultuously along at an estimated speed of 30 miles an hour, and the terrific onrush and battle of the waters make a spectacle that is equal to that of the falls themselves. About midway in the gorge the channel makes an abrupt, short turn to the left, and here the onslaught of the torrent has worn out a vast circular basin forming the celebrated Whirlpool. From the Whirlpool the channel is broader and less steep. The plateau ends abruptly at Lewiston, and its edge, where it steeply descends to the littoral plain of Ontario, is marked by a long escarpment parallel with the shores of the lake, known to geologists as the Niagara Escarpment, which rises to about 250 feet above the level of Ontario. The last 7 miles of the journey is over the littoral plain with a fall of only about 3 feet.

The position of Niagara Falls marks the present extension of the work of the river in cutting this great gorge. Geologists have proved that the Niagara River began its existence after the retreat of the last or Wisconsin ice sheet; in other words, most students of glacial geology agree that the history of the river begins as the waters of the Lake Ontario basin were drawn to a level somewhat lower than the present level of Lake Erie, following the flooding of the entire district by lake waters shortly after the ice had uncovered the present site of Niagara Gorge.

The great work of the river has been in excavating the gorge from Lewiston back to the present position of the cataract. The falls first poured over the edge of the escarpment at Lewiston and began to dig their way back through hard limestone and sandstone, interbedded with a coherent though softer shale, and for a part of the distance the material was incoherent drift. The process of excavation may be observed at the falls. The rocks lie in layers, and the upper covering of loose drift yields readily to the wash of the waters. Under the drift is hard limestone, called the Niagara limestone, 80 feet in thickness; beneath the limestone lies the softer Niagara shale, with a thickness of 50 feet; then for 35 feet is the Clinton group, an alternation of limestone, shale, and sandstone, the whole resting upon a bed several hundred feet in thickness of soft sandy shale, which is not known to be interrupted except by a single hard layer of sandstone from 10 to 20 feet thick. These shales and sandstone are called the Medina formation. The hard top layer of limestone projects like a shelf over the edge of the falls so that the water leaps from it and strikes the surface of the pool below. Now and then large blocks of the upper limestone break away and fall into the pool, owing doubtless to erosion of the softer shale beneath, the limestone thus being deprived of its support. Just how the shale is eroded and how the harder rock beneath it is affected is in doubt. It is observed in the Cave of the Winds, where visitors may pass behind one of the thinner segments of the falls, that spray and water are constantly dashing against the shale and probably wear it away. The shale is also calcareous, and, this element in it being soluble, it is likely that solution has a part in the work of destruction. As the water contains no sediment, the Niagara River cannot use this agency, as most rivers do, to scour out its bed; but the broken pieces of rock that fall into the river below the cataract are undoubtedly potent in digging out and deepening the channel. Government engineers have discovered depths of 200 feet a half mile below the falls, and Gilbert and other geologists assume that the falls are scouring the river bed as deeply now as they did when they were situated farther down the stream. This is occurring in front of the Horseshoe Falls, but not at the American Falls, where the volume of water is comparatively small. The broken rock here piles up as a talus at the



NIAGARA FALLS
FROM THE AMERICAN SIDE

foot of the fall, and upon it the force of the descending water is spent.

The edge of the American Falls is retreating much less rapidly than that of the Horseshoe Falls. The average annual recession on the American side is estimated at between 0.2 and 0.6 foot a year, but at the Horseshoe Falls recent measurements by the United States Geological Survey show that the rate of recession is about 5 feet a year since 1842. It is probable that this figure holds also for a period extending back to 1700, but it is thought that the rate during a long period before that time was much slower. The thickness of the resistant bed at the crest of the falls is far from uniform, and there is evidence that at one period after the retreat of the ice the upper lakes found outlets through other rivers and only Lake Erie was drained by the Niagara, whose small volume of water then must have been greatly inferior to that of to-day in its ability to excavate the gorge. The assured fact is that the gorge is gradually being cut back towards Lake Erie. The age of the falls is estimated by geologists of the United States Geological Survey as varying between 20,000 to 35,000 years. It is believed that more precise estimates cannot be had with the data now available.

About a half mile above the brink of the falls, Goat Island divides the river into two unequal streams, the one on the American side being comparatively shallow and narrow and discharging over the American Falls, while most of the river swings around to the left of Goat Island and discharges over the Horseshoe or Canadian Falls. The resemblance of the outline of these falls to a horseshoe has been destroyed by the more rapid recession of the central part of the cataract edge. The improvements for Queen Victoria Park cut off 415 feet on the west side. The American Falls are 1060 feet wide, and the water is very shallow as it plunges over the edge, falling 167 feet. The Horseshoe Falls have a total width of 2950 feet, measured along the curve, or 1230 across the chord, an estimated depth of 20 feet, and a vertical height of 158 feet. This main cataract carries 95.17 per cent of the entire volume of the river, leaving the American Falls only 4.83 per cent. As the water is derived from the immense reservoirs of the lakes, there is little variation in the quantity, the differences in volume depending not so much upon precipitation as upon the strong winds which slightly retard or accelerate the movement of the surface waters of Lake Erie to the mouth of the river. The normal flow pouring over the cataract is about 500,000 tons a minute.

Sightseeing has been greatly facilitated, and visitors protected from imposition since 1885, by the conversion of the land on both sides of the falls into public parks. The New York State Reservation contains 107 acres and the Queen Victoria Niagara Falls Park on the Canadian side 154 acres. An electric trolley line has been built through the gorge along the brink of the river on the American side and connects by the Queenston Bridge with the electric line skirting the Canadian heights along the gorge and extending past the Horseshoe Falls to Chippawa; a railroad also skirts the United States edge of the gorge, so that visitors may see its entire length and take in the terrific features of the rapids and the Whirlpool. The cantilever bridge, 910 feet long, spanning the gorge some distance above the Whirlpool, was the first bridge of the kind to be built in America; the railroad steel arch bridge, 300 feet below the cantilever, has a carriageway below the track.

It is only in recent years that important attempts have been made to utilize the energy of Niagara Falls for industrial purposes. The first hydraulic plant was erected in 1853, but it was not a financial success. Later works were erected on both the Canadian and the American side. The largest plant is that of a power company which generates electricity by leading water through a canal from above the falls to a wheel pit in which are turbines, the water discharging through a tunnel into the river below the falls. A treaty ratified in 1910 between Great Britain and Canada fixes the amount of water that can be diverted on the American side for power purposes at 20,000 second feet and on the Canadian side at 36,000 second feet. In June, 1911, the estimated average diversion of the water was 24,410 second feet, besides 400 second feet taken by the Lockport Company for the Erie Canal. Buffalo, 22 miles distant, takes electricity for its city railroads and other power purposes. Over three-fourths of the power generated, however, is consumed in the neighborhood of the falls. About 300,000 horse power is generated at present. Part of this supply is used for the industries developed near the falls, notably for the manufacture of calcium carbide, carborundum, and aluminium.

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NIAGARA SERIES. A subdivision of the Upper Silurian (or Silurian) system of rocks. According to the modern system of classification it includes the Clinton, Rochester, Lockport, and Guelph formations. The rocks of the Niagara series are found in central and western New York and extend southward through Ohio, Pennsylvania, Virginia, eastern Kentucky, and Tennessee and westward through Illinois, Missouri, Iowa, and Arkansas. They are also known westward in Wisconsin and Indiana and cover considerable areas in Canada. The Medina strata extend westward from central New York into Ohio; the Clinton division carries a bed of red hematite iron ore which is found from New York to Birmingham, Ala., where it forms the basis of a large steel industry. The limestone and shale of the Niagara epoch are seen at Niagara Falls, where it is the undermining of the limestone, due to the wearing away of the shale, which has caused the falls. Fossils are found in great abundance in most of the rocks. See Clinton Stage; Silurian System.

NIAM-NIAM, nē-äm′ nē-äm′, Azande, or Zandeh. A numerous people of Negro-Hamite blood on the Nile-Congo-Chad watershed north of the Welle River, southeastern Sudan, between lat. 4° and 7° N. and long. 25° and 29° E. They are negroes, brachycephalic (index 79), corpulent, of medium height, and dull-chocolate color. They are noted for their cannibalism, which is hinted at in the name Niam-Niam, the Dinka word for "great eaters." Their houses are conical, with clay walls and thatched roofs; the kitchen hut and sleeping hut for boys form part of the dwelling group. They are hunters and agriculturists, excel in textile work and handicraft in clay, wood, and iron, and play on a five-stringed harp. They fight with throwing knives, swords, assegais, clubs, and shields. Numbering over 2,000,000, they are divided into small sovereignties, partly independent, partly under the Belgian Congo. All the Azande tribes except the Abandia and Adio have chiefs from the Avurn-Gura family or caste, Gura being the name of the founder of this dynasty. They are divided into gentes with paternal descent and exogamy, but the marriage rules are stretched in favor of the reigning caste. In the religious system of these natives divination plays an important part. Hardly any enterprise is undertaken without administering a poisonous fluid to a hen, the survival of the bird indicating good fortune. In case of alleged sorcery the same ordeal is resorted to, but sometimes the suspected criminal himself is made to swallow the potion. It is a prerogative of the reigning caste to be exempt from this personal trial. Consult: Georg Schweinfurth, *The Heart of Africa*, vol. ii (New York, 1874); Stanford, *Africa* (London, 1895); Joseph Deniker, *Races of Man* (ib., 1900); Czekanowski, in *Zeitschrift für Ethnologie* (Berlin, 1909); Hutereau, *Notes sur la vie familiale et juridique de quelques populations du Congo Belge* (Brussels, 1909).

NIAN′TIC, or **NEHANTIC.** A small Algonquian tribe, formerly occupying the southwestern coast of Rhode Island, adjoining the Narraganset (q.v.), who claimed dominion over them. Their principal village was at Fort Neck, on the Great Pond in Charlestown. By refusing to join the hostiles in King Philip's War of 1675–76, they were able to preserve their territory and tribal organization, and at the close of the war the Narraganset who submitted to the English were settled with the Niantic, and the whole body thenceforth took the name of Narraganset. A detached body, supposed to have been cut off from the main tribe by an invasion of the Pequot, resided on Niantic Bay, in Connecticut. They were subject to the Pequot and with them were nearly destroyed in the War of 1637, the few survivors gradually wasting away by emigration and disease until none were left in the original territory. The present Narraganset of Rhode Island are chiefly of Niantic descent so far as their Indian blood is concerned. See Mohegan; Pequot.

NIAS, nē′äs′. An island in the Indian Ocean belonging to the Netherlands and situated 65 miles from the west coast of Sumatra (Map: Australasia, B 2). It is 80 miles long, 28 miles wide, and has an area of about 1800 square miles. It is mountainous and surrounded by coral reefs, and the soil is very fertile, the chief products being rice, sugar, and pepper, the latter amounting to over 100,000 pounds annually. The inhabitants, whose number is estimated at 200,000, are a Malay people closely akin to the Battaks. They are somewhat lighter in color of skin than many of the Malayan tribes. In head form they tend towards dolichocephaly. The island has suffered much from intertribal wars, and the slave trade continued here with unusual persistency. Consult: Modigliano, *Un viaggio a Nias* (Milan, 1890); H. Sundermann, "Kleine niassische Chrestomathie," in *Bijdragen voor de taal- land- en volkenkunde van Nederlandsch Indie*, vol. vii (5th series, The Hague, 1892); id., *Kurzgefasste niassische Grammatik* (Mörs, 1892); id., *Deutsch-niassisches Wörterbuch* (ib., 1892).

NIATA, nyä′tȧ, or **NATA,** nä′tȧ. A breed of deformed cattle, long existent in Argentina, but now very rare. These animals greatly interested Darwin as an example of a variation believed to have originated early in the eighteenth century among the Patagonian Indians and to have remained constant for a long period. They have very short, broad foreheads, upturned noses, lips withdrawn, showing the teeth, and a ludicrous facial resemblance to pug dogs. They are remarkable for breeding true and the amount of influence exerted on the hybrid offspring when crossed with other cattle. Consult Charles Darwin, *A Naturalist's Voyage around the World* (new ed., New York, 1908). Cf. Prepotency.

NIBELUNGEN, Der Ring des. See Ring of the Nibelungen.

NIBELUNGENLIED, nē′be-lụng′en-lēt (Ger., Song of the Nibelungs). A great German epic, composed by an unknown poet on the basis of earlier German songs, traditions, and possibly Latin poems, at the end of the twelfth or the beginning of the thirteenth century. There are 28 more or less complete manuscripts, in 31 fragments. Ten of these are complete. Of these the most important are the three parchment manuscripts of the thirteenth century, known as A (the Hohenems-Munich, now in Munich), B (the Saint-Gall, now in Saint-Gall), and C (the Hohenems-Lassberg, now in Donaueschingen). The original form of the poem is probably in none of the 10, but that known as B seems closest to the original. A seems an abridgment, C an enlargement of B, and to one of these three types all the manuscripts and fragments belong. The song falls into two parts, the first dealing with the wooing, marriage, and murder of Siegfried, the second with the vengeance of his widow, Kriemhild. The scene of the former is the Burgundian court of Gunther and his wife, Brunhilde, at Worms, of the latter the Hunnish court of Etzel or Attila; but both parts appear to have got their present form among the Franks, whence the legends spread over Germany and to Scandinavia, where we find them much modified in the *Edda* and the *Thidreksaga*. The outline of the story is this: Siegfried, King of the Nibelungs in Nether Germany, woos Kriemhild, sister of the Burgundian King Gunther, for whom he procures as a wife Brunhilde, Queen of Iceland, by wearing a magic cloak which renders its wearer invisible, and is rewarded with Kriemhild's hand. Brunhilde discovers the deception and procures the murder of Siegfried by Hagen. To avenge herself Kriemhild accepts the suit of Etzel and invites Gunther with his brothers and courtiers to visit her. Hagen perceives her intent, buries the Nibelungen treasure in the Rhine, and, after vain efforts to dissuade the King, accompanies him. The Burgundians are attacked in a hall, and all are finally killed, not without loss to Etzel of Kriemhild, of their son, and of all his warriors, save only Dietrich von Bern (Theodoric of Verona) and his companion, Hildebrand, hero of the *Hildebrandslied.* Then follows in all manuscripts a *Lament* (*Die Klage*) older than the *Song* and also anonymous. The Nibelungen strophe consists of four rhymed lines (aabb) with three beats to each half line, except the last, which has four. The historical substratum of the legend is the defeat of the Burgundian King Gundahari by Attila in 437. Kriemhild is perhaps identical with the girl Ildico (Hilde), who was with him at his death, according to Jordanes, but the actual Theodoric belongs to a later period, and if Siegfried be, as many have thought, identical with Arminius, he is more than four centuries earlier. Others regard Siegfried, with Brunhilde, as mythical. The poem derives such unity as it has from various forms of the conflicting claims of double allegiance. In Kriemhild there is the conflict between wife, sister, and mother; in Siegfried between husband and vassal; in Hagen between chivalric honor and allegiance; and in Rüdiger, Etzel's great vassal, between hospitality and loyalty. Thus, in one form or another that faithfulness (*Treue*) which Heine said was the strongest characteristic of the German nation is the mainspring of tragic action. But the *Song* lacks unity of inner structure. Passages of deep feeling and pathos alternate not alone with those of fierce, rugged strength, but with others trivial, grotesque, or even, as in Gunther's bridal night, downright burlesque and coarse. The episodes too are in some cases so inartistically welded that a school of critics, Lachmann at their head, even thought they could distinguish the elements of compilation; but this position is now generally abandoned. The history of the *Nibelungenlied* is not without interest. For two centuries it was quite forgotten. Bodmer (q.v.) printed fragments of it in 1757, but it was received with indifference by scholars and with contempt by King Frederick II. The national spirit roused by the War of Liberation was more favorable to the legend. A soldiers' edition was printed in 1815, and in the next year Karl Lachmann published his epoch-making study. Since then the *Nibelungenlied* has grown steadily in scholastic and popular favor till its contents have become part of German literary consciousness. It has been the subject of critical studies by the Grimms, Müllenhoff, Zarncke, Bartsch, Scherer, and others, has been edited several times in its three versions, and well translated into modern German by Simrock, Bartsch, L. Freytag, and others. There are English versions by W. N. Lettsom (1850; new ed., 1903), Foster-Barham (1887), Birch (1887), G. H. Needler (1904), and D. B. Shumway (1911).

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NIB'LO'S GARDEN. A former New York theatre on Broadway, near Prince Street, established in 1828 under the name of the Sans Souci and later the property of William Niblo. It was twice burned and rebuilt and was finally torn down in 1900.

NICÆA, nī-sē'ȧ, or **NICE,** nēs (Gk. Νίκη, *Nikē,* Νικαία, *Nikaia,* city of victory). A city of Bithynia in Asia Minor, situated at the eastern end of Lake Ascania not far from Nicomedia, the Eastern capital before Constantinople was built. It was built on the site of an older town by Antigonus (316 B.C.) and received the name of Antigoneia, which Lysimachus changed to Nicæa, in honor of his wife. It was a handsome town and of great importance in the time of the Roman and Byzantine emperors; all the streets crossed each other at right angles, and from a magnificent monument in the centre the four gates of the city were visible. It was early the residence of a Christian bishop, later of an archbishop. In 1078 it was captured by the Seljuks, and in 1097 it was taken by the Crusaders. Theodore Lascaris (q.v.) made it the capital of his dominions in Asia Minor in 1206, and it remained the seat of an independent Greek state until 1261, when Michael Palæologus, Emperor of Nicæa, restored the Byzantine Empire. It fell into the power of the Osmanlis in 1326. Nicæa's chief importance in history is in connection with the two church councils held there. (See NICÆA, COUNCILS OF.) At the present time it is a village of about 150 houses called Isnik, or Iznik, with many interesting ruins. The church in which the councils are said to have been held is now a mosque.

NICÆA, COUNCILS OF. Two ecumenical councils of the Christian Church, held at Nicæa in Bithynia. 1. The first was convened by the Emperor Constantine in 325 to settle the Arian controversy. Of some 1800 bishops in the Empire, 318 attended the council. The total number of delegates, including presbyters and others, was probably more than 1500. The eastern provinces were largely represented. Many of the members were venerable and illustrious men, among whom were Eusebius of Cæsarea, Athanasius, Arius, Paphnutius, Paul of Neo-Cæsarea, Jacob of Nisibis, Spiridion of Cyrus, Hosius of Cordova, two Roman presbyters—influential as representing Pope Sylvester, who was kept at home by the infirmities of age—a Persian bishop from the eastern frontier, and a Gothic bishop from the north. Constantine's object in convening the council, as announced in his opening address, was to heal the divisions in the Church. The first sessions were devoted chiefly to a discussion of the Arian views, accompanied with an examination of Arius himself. He maintained that the Son of God was a creature, though indeed the most exalted of all; that he had been made out of nothing; that he was not eternally existent; and that, in his own free will, he was capable of right and wrong. The first attempt to reach a decision was made by producing an ancient creed of Palestine, the basis of that which was ultimately adopted, but opposed at first by the orthodox—the more violently because the Arians were willing to adopt it. A letter having been read from Eusebius of Nicomedia, in which he declared that to assert the Son to be uncreated would be to say that he was of one substance (*ὁμοούσιος*) with the Father, the expression was laid hold of as furnishing the very test for which they were seeking. For the confession of faith adopted at the end of the deliberations, see NICENE CREED.

Another controversy determined had reference to the time for observing Easter. The question was: Ought the Christian Passover to be celebrated on the same day as the Jewish—the fourteenth day of the month Nisan—or on the following Sunday? On the one side were the apostolic traditions and on the other the Catholic spirit seeking separation from Jewish ideas. At the date of the council the Judaic time was observed by the principal Eastern churches and the Christian time by the Western churches, with a part of the Eastern. The decision was in favor of the Christian time, the Sunday after the fourteenth of Nisan. Twenty canons were also passed on various subjects pertaining to morality and religion. For a minute and picturesque description of this council, consult Boyle, *A Historical View of the Council of Nice, with a Translation of Documents*, in Cruse's translation of Eusebius (New York, 1856), and A. P. Stanley, *Lectures on the History of the Eastern Church* (London, 1861; new ed., New York, 1907). For the canons, consult C. H. Turner, *The Canons of Nicea* (Oxford, 1899–1913).

2. The second Council of Nicæa was convened in 786 by the Empress Irene and her son Constantine, dissolved because of the tumults raised by the image-breaking party and reassembled the following year. Three hundred and seventy-five bishops attended from Greece, Thrace, the isles of the Archipelago, Sicily, and Italy. The council was occasioned by the Emperor's ill-judged severity in forbidding the use of images for any purpose and causing them everywhere to be removed and destroyed, and by the violent opposition to his course. For the history of this controversy, see IMAGE WORSHIP. On both councils, consult K. J. von Hefele, *History of the Christian Councils*, vol. i (Edinburgh, 1871), and W. F. Adeney, *The Greek and Eastern Churches* (New York, 1908).

NICÆNO-CONSTANTINOPOLITAN (nī-sē'nō) CREED. See NICENE CREED.

NICAISE, nē'kȧz', EDOUARD (1838–96). A French surgeon and medical historian, born at Port-à-Binson (Marne). He studied medicine at Rheims and Paris (M.D., 1866) and was surgeon of various Paris hospitals after 1876. In 1894 he became a member of the Académie de Médecine. He was a prolific writer—author of over 200 essays—and edited: *La grande chirurgie de Guy de Chauliac* (1890); *Chirurgie de Maître Henri de Mondeville* (1893); Pierre Franco's *Chirurgie composée en 1861* (1895). Among his books may be mentioned *L'Antisepsie dans la pratique de la chirurgie journalière* (1896).

NICAN'DER (Lat., from Gk. *Νίκανδρος*, *Nikandros*). A Greek physician, grammarian, and poet, born at Claros, near Colophon in Asia, about 150 B.C. Of his numerous works in verse and prose only two poems are extant: the *Θηριακά* (nearly 1000 hexameter lines), on remedies against the wounds inflicted by venomous animals; and *'Αλεξιφάρμακα* (more than 600 hexameter lines), on poisons and their antidotes. Among his lost works was the *Ἑτεροιούμενα* (*Transformations*), which is said to have been one of Ovid's sources for his *Metamorphoses*. He is frequently quoted by Pliny, Galen, and other ancient writers as an authority on all matters relating to toxicology. Consult the edition by Schneider, revised by Keil (Leipzig, 1856); also, for Vergil's indebtedness to him in the *Georgics*, Conington's *Vergil*, ii, 141–143; see also W. Vollgraff, *Nikander und Ovid* (Groningen, 1909 et seq.).

NICANDER, nē-kăn'dēr, KARL AUGUST (1799–1839). A Swedish poet, born at Strengnäs. He studied at the University of Upsala. The great prize of the Swedish Academy awarded his poem *Tassos död* (1826) gave him an opportunity to go to Italy (1827–29). After his return he lived in want almost to the day of his death. His earliest important work was the drama *Runesvärdet* (1821); this was followed by a collection of poems and tales, *Hesperider* (1838), and the poem *Minnen från Södern* (1831–39), containing his recollections of Italy, a land which appealed strongly to his imagination. His best poem, *Lejonet i öknen* (1838), is a eulogy of Napoleon. A collection of his verse appeared in Stockholm in 1839–41 (4 vols.; 5th ed., 1883).

NICARAGUA, nē'kȧ-rä'gwȧ (from *Niquirao*, *Nicarao*, a Nahua tribe inhabiting the country in the sixteenth century). The largest of the Central American republics. It is bounded on the north by Honduras, on the east by the Caribbean Sea, on the south by Costa Rica, and on the west by the Pacific Ocean. Its seacoast on the Caribbean is about 300 miles; on the Pacific, 200 miles. It extends between lat. 10° 41' and 15° N. and long. 83° 15' and 87° 40' W. (Map: Central America, E 4). Civilization is centred in the western third of the country. The settlements extend scarcely 100 miles inland from the Pacific. The wide Caribbean slope has no towns of importance excepting Bluefields and Greytown (San Juan del Norte). The low and hot Caribbean plain is under the influence of the moist trade winds, which nurture the most luxuriant tropical vegetation. Almost impassable virgin forests, inhabited by scattered bands of Indians, spread from the western mountains to the Caribbean; but, though this larger part of the country is rich in valuable timber and its higher lands contain the centres of gold mining, it is the home of few white men. The higher and drier regions of the western mountain ranges with the plain between them are, on the other hand, adapted for planting and other industries and have attained considerable development. The estimated area is 49,200 square miles.

Topography. The Caribbean coast is low and poorly supplied with harbors. It has three ports, none of them adapted for large ships. Greytown, in the delta of the San Juan River, formerly had a splendid harbor with 30 feet of water at low tide, but during a flood in 1855 the river widened and deepened the Colorado branch of the delta so that most of the river now discharges south of Greytown in Costa Rica, leaving Greytown harbor, which has also been silted by the sea, very shallow. The port of Gracias à Dios is also shallow. Bluefields, on a large lagoon, is the most important east-coast port. The Pacific coast is high, and the water is deep close to the shore. The harbor of Corinto is one of the best-protected ports on the Pacific, and San Juan del Sur has a small but deep and safe harbor. St. Andrews, Old Providence, and Great and Little Corn islands, near the Caribbean coast, are centres of banana and coconut growing.

Geographically Nicaragua is divided into distinct zones by two chains of mountains which, more or less broken and with numerous flanking spurs, traverse the Republic in a northwest and southeast direction parallel with the Pacific coast. The western or coast range is a part of the mountain system extending through most of Central America. In Nicaragua it is only 10 to 20 miles from the Pacific, and its nearness to the ocean accounts for the fact that no considerable streams discharge from that slope into the Pacific. This western range, with the depressed plain lying between it and the eastern range, forms the principal line of volcanic energy and is marked by a number of extinct and active volcanoes built up by outpouring lava. None of them reaches 7000 feet above sea level. Masaya (2972 feet) was violently active at different periods from the time of the Spanish Conquest until 1772, when a vast mass of lava was ejected from its crater, covering a tract of land 8 miles long by 2 wide. It was dormant between 1861 and May, 1902, when it resumed activity. Coseguina (3600 feet) had a terrific eruption period in 1835, but has since been inactive. The Spaniards founded the city of León Viejo at the foot of Momotombo (7000 feet), but the eruption of 1609 so alarmed the citizens that they removed en masse 23 miles from the town they had founded and established the new León on its present site. In recent years this volcano has ejected dust and scoria without inflicting damage. Other well-known volcanic summits are Telica, Las Pilas, Mombacho, Zapatera, Ometepe, El Viejo, and Santa Clara. The severe earthquakes recorded in Nicaragua are associated with its volcanic phenomena.

The eastern range enters Nicaragua from Honduras and extends in a general southeasterly direction to the coast north of the San Juan River, about 50 miles from its mouth. It sends out numerous spurs towards the Caribbean, between which flow the many rivers of the country. Between the eastern and western ranges lies the great interior basin, about 300 miles long and 100 miles wide, where the population and industries are in great part centred, chiefly near the west shores, or a little to the north and west of the two great lakes of the country. The dominating topographic features are thus the wide, low, rolling plain of the east, interspersed with mountains and spurs and, towards the northwest, with highlands; the two cordilleras; the depressed plain between them with its two large lakes; and the steep, narrow Pacific slope.

Hydrography. In the plain or basin between the ranges are two large lakes, Managua and Nicaragua, connected by the river Tipitapa and collecting the drainage of the basin, which has an area of about 12,000 square miles. The larger lake, Nicaragua, comprises over 3000 square miles and is 110 miles long, with an average width of 40 miles. Its longer axis is parallel with the Pacific, from which it is only 11 miles distant at the nearest point. It is from 10 to 260 feet deep, with its surface about 106 feet above the sea level. It intermittently receives the waters of the shallower Lake Managua (38 miles long by 10 to 16 wide), through the Tipitapa River. The waters of these lakes are carried to the Caribbean by the San Juan River, which has an average width of 1500 feet and a minimum discharge of about 10,000 cubic feet per second. Its course is 120 miles, and it is navigable for small draft steamers except at a few rapids, which offer obstruction in the dry season. In the construction of the Nicaragua Canal it was proposed to use its waters for many miles. The other rivers are mainly to the north of the San Juan, east of the mountain ranges, and drain the wide, forested plain. Most important among them are the Segovia or Wanks, forming a part of the north boundary, about 300 miles in length, but with a narrow drainage basin which does not carry a volume of water proportionate to its length; the Río Grande, about 230 miles long, navigable for small vessels for 100 miles from the sea if a channel were cut through its bar; and the Bluefields River, navigable for 65 miles, its banks lined with banana plantations, whose crop is carried on the river to Bluefields for shipment to the United States. The Pacific coast rivers are unimportant.

Climate. The climate is very warm, but healthful, the prevailing trade winds mitigating the discomforts of the temperature, which varies little, seldom rising above 85°F. or falling below 70° F. The seasons are divided into the wet and the dry, but on the Caribbean side they are not well defined, as rain falls nearly every day in the year. The precipitation at Greytown is 200–250 inches annually, while in the west, in the higher land, the precipitation is only 65–80 inches. The soil is very productive. On the Caribbean slope it is mainly reddish clay covered by leaf humus, and the cultivated regions of the west have a deep, black soil, in which fertilizing lavas and volcanic dust are large constituents.

Flora. The eastern plain is covered with trees of great size, beneath which is a thick growth of bushes and vines. There are 54 varieties of trees suitable for hardwood lumber; 40 varieties supplying industrial or medicinal gums, balsams, resins, fibres, oils, extracts, food, drink, and spices; and 74 varieties of fruit trees, of which 17 are wild and 57 cultivated. Rubber abounds, and its production is increasing, despite the ruinous methods used in its collection. The resources of the forest are enormous, but as yet are little utilized. Citrus fruits flourish, especially in the western part of the country. The cultivation of most tropical crops is considerably developed and has a great future.

Fauna. Animal life is very rich and varied, particularly in the moist eastern regions. The principal mammals are the jaguar, cougar, wild swine, deer, monkeys, squirrels, and opossums. Alligators are found in the rivers and along their shores, and turtles, snakes, some very poisonous, and insect life are superabundant.

Geology and Mineral Resources. The Caribbean plain is alluvial. Far inland behind the plain are the highlands of Segovia, Matagalpa, and Chontales, composed of Paleozoic and Mesozoic strata, with granite and basalt intrusions. The gold diggings are found chiefly in these highlands. The broad depression between the mountains extending from near the Gulf of Fonseca to the lakes and the valley of the San Juan is mainly Paleozoic, with a deep covering of volcanic dust and tufa. The country west of the lakes is formed to a great depth of matter ejected from the line of volcanic fissures and cones which pass through or appear above it. On this erupted mass are situated most of the larger towns, and here is the dwelling place of over seven-tenths of the population. American and British companies do most of the mining. In 1911 there were 500 mines, mostly of gold, registered in the Republic. Those of Chontales yield from one-fourth of an ounce to two ounces of gold to the ton of ore; those of Nueva Segovia from one and a half to three ounces. Rich deposits of silver are known to exist, as they were worked in the sixteenth and seventeenth centuries. Tin, nickel, antimony, arsenic, and other metals and minerals have been located, but are not economically important.

Agriculture. The rich farming regions of the west are capable of vastly greater development than has yet been attained. The coffee plantations (many of them belonging to Americans and Germans) yield the principal crop, the berry being grown throughout the highlands of the north and northwest. The crop for the year 1908–09 was 14,200,000 pounds, and, in 1910, 12,028,516 kilos were exported. Bananas are cultivated in the Bluefields region, and the industry is rapidly increasing. In 1912, 1,447,077 bunches, valued at $423,049, were exported. Sugar cane is extensively grown throughout the Republic and is used in the production of coarse brown sugar and aguardiente, a kind of rum. Cacao of a superior quality is cultivated to some extent. Cotton, tobacco, rubber, corn, rice, breadfruit, coconuts, black beans, and sweet potatoes are also produced. Vegetables of the temperate zone thrive in the upland regions. Cattle raising, particularly in the northwestern provinces, is one of the chief sources of wealth. Large haciendas are devoted to this industry, and many hides are exported.

Manufactures. Manufacturing enterprises are little developed. Coarse cotton fabrics are made, and house furniture is supplied by local factories. Large quantities of cigars are produced; also roofing tiles and other forms of pottery. Boots and shoes, sugar, rum, beer, candles, and soap are also manufactured. The Indian industries include the making of hammocks, superior straw hats, jewelry of gold and silver, potteries, and carvings. The country depends for its manufactures chiefly upon imports.

Commerce. The foreign trade of Nicaragua has been gradually increasing during the past decade. The following table shows the amount of the imports and exports:

	1907	1913
Imports	$3,224,173	$5,604,300
Exports	3,363,522	7,494,100

The share of the leading countries in this trade in 1912 is indicated by the following table:

COUNTRIES	IMPORTS		EXPORTS	
	Amount	Per cent	Amount	Per cent
United States	$2,549,026	50.1	$1,766,548	45.8
United Kingdom	939,290	18.9	515,381	13.4
Germany	604,038	12.2	702,256	18.2
France	256,255	5.2	626,083	16.2
Italy	121,610	2.5	48,437	1.2
Other countries	526,601	11.1	202,811	5.2

The chief articles of export, given in order of the total value in 1912, are coffee, gold, bananas, hides and skins, rubber, woods, sugar, cotton, dyewoods and dyes, silver, coconuts, cacao, and turtles. The principal imports are cotton goods, foodstuffs, iron and steel manufactures, liquors, chemicals and drugs, silks, and woolen goods. Over one-half the foreign trade of the country is carried on through the port of Corinto.

Transportation. Bluefields on the east coast has direct steamship connection with New Orleans. The two Pacific ports, Corinto and San Juan del Sur, are ports of call for numerous lines of steamers, which afford the country regular and ample service. In 1911 one steamship, of 112 tons, and six sailing vessels, with a total tonnage of 4029 tons, were owned by Nicaraguans and used in the merchant trade. There are also several small steamers in service on Lake Nicaragua. The present railway mileage amounts to 191 miles. It traverses only the extreme western part of the Republic, starting from Corinto and reaching León, Managua, and Granada. There are also 20 miles of light lumber railways on the Atlantic coast.

Banking. The chief banking institution is the National Bank of Nicaragua, with a capital of $300,000. New York bankers hold 51 per cent of the stock and the government the remaining 49 per cent. It is the government depository, issues bank notes, and transacts ordinary commercial banking business. There are also numerous private banking houses doing business in the country.

Government. Nicaragua has a unitary republican form of government. It has had numerous constitutions; the one now in force was adopted in 1912 and confirmed in 1913. The legislative power is vested in a Congress composed of a Senate and Chamber of Deputies. The departments are divided into electoral districts with a population of 15,000 or major fraction, each of which chooses a deputy and a Senator. The deputies are elected for four years and must be secular citizens over 25 years old. The Senators are elected for six years and must be secular citizens over 40 years of age. The President, Vice President, and two designates must be native citizens over 30 years of age. The President and Vice President are elected for four years by a direct popular vote. The President exercises administrative functions through a council of ministers, composed of the heads of the five departments of the Interior (Justice, Police, and Religion), War and Marine, Foreign Affairs, Finance, and Public Works. The Republic is divided into 13 departments, 2 comarcas, and 3 districts, each of which is under a Governor, who is also commander of the military forces in his department or district. There is a supreme court at Managua and three courts of appeal at León, Masaya, and Bluefields. The military forces comprise the active army, the reserve, and the national guard.

Army. The active army numbers about 4000 men; the maximum war strength is estimated at about 40,000. Service is supposed to be compulsory between the ages of 17 and 55 years, active service for one year only.

Finance. The government derives over half its income from customs duties. Taxes on liquors, tobacco, slaughterhouses, and railways, and the revenues of the post offices, telegraphs, and telephones also furnish considerable amounts. About one-half of the expenditures are made by the departments of finance and public credit and war and navy. In 1914 the ordinary revenues amounted to 2,479,313 córdobas and the ordinary expenditures to 1,980,328 córdobas. In December, 1914, the foreign debt amounted to 7,110,000 córdobas, of which the principal items were the Ethelburga syndicate 6 per cent sterling loan of 1909, 5,500,000 córdobas, and the Brown-Seligman loan of 1913, 1,060,000 córdobas. At the same date the interior debt was 6,670,662 córdobas. (Córdoba = $1 American.)

In 1911 the finances of the country were in a bad condition owing to the continued internal disturbances. To relieve the situation an arrangement was entered into with New York banking houses by which they advanced money to Nicaragua to meet her obligations. These advances were guaranteed by the customs receipts, which were placed under the supervision of an American collector general of customs. This plan resulted in a large increase in the customs collections and an improvement in the rate of exchange. In 1913 a plan of monetary reform was adopted in order to rid the country of the worthless paper and the fluctuating silver currency. The new coinage has for its basis the *córdoba*, a theoretical gold coin of the same value as the United States dollar. No gold is coined as yet; the silver coins are the córdoba and its fractions (50, 25, and 10 centavos). The paper currency consists of notes, based on a gold reserve, issued by the National Bank of Nicaragua.

Weights and Measures. The metric system has been legally adopted, but numerous old Spanish denominations are still in use.

Population. The census returns are largely estimates. The census of 1900 gave a total of 500,000, and in 1910 the population was estimated at 600,000. Managua is the capital, with 34,872 inhabitants. Other large towns are León (62,569), Granada (35,000), Matagalpa (15,749), Masaya (13,023), and Chinandega (10,542). The number of descendants of Spanish settlers is only about 17,000, the great mass of the population consisting of Indians, negroes, and mixed bloods. The Indians supply most of the labor and are docile and industrious. Most of the country people live in villages, many of them traveling several miles to their fields. The efforts to induce immigration have not been successful.

Education and Religion. Although progress has been made in the development of the educational system, still the majority of the people are illiterate. The principal university is at León, with faculties of law and medicine. The universities at Managua and Granada have only faculties of law. There are eight colleges, including two normal schools at Managua. In 1913 there were 40 superior and 295 elementary schools supported by the government, which had 1153 teachers and 30,196 pupils. The only free public library is maintained by the government at Managua. The National Museum, with industrial, commercial, and scientific sections, and the national archives are both at Managua. The constitution recognizes the Roman Catholic religion as the faith of the majority of Nicaraguans, but accords freedom to all beliefs and prohibits special favors to any.

History. The coast of Nicaragua was first seen by Columbus in 1502. In 1522 Gil Gonzales Dávila discovered Lake Nicaragua, and his pilot, Alonso Niño, visited Fonseca Bay. In 1526 Pedrarias Dávila led an expedition into the country. During the Spanish colonial régime it formed a part of the Captaincy General of Guatemala and led a peaceful and quite prosperous existence. Nicaragua remained loyal to the mother country during the first period of the revolutionary disturbances in Spanish America, but in 1821 it declared its independence and the following year joined the Mexican Empire under Itúrbide. It became a member of the United Provinces of Central America in 1823, which was recognized by Mexico the next year. A struggle between the Federalists and Centralists broke out at once and continued until the dissolution of the confederacy in 1839, when Nicaragua became an independent state. The strife of parties, however, and the play of personal ambition gave the country little peace. In 1841 a dispute arose with Great Britain concerning the rights of a native chief on the Mosquito Coast. This threatened at one time to lead to hostilities, but the matter was finally settled by a clause inserted in the Clayton-Bulwer Treaty of 1850 and by a separate treaty, in which Great Britain ceded all rights of a protectorate over the disputed territory to Nicaragua. The year 1855 was signalized by the famous filibustering expedition of William Walker (q.v.), whose attempt to establish a slaveholding state in Central America for once impelled the different states to common action. Walker was driven out in 1857, and upon his renewing his attempt was captured and shot (1860). There followed for Nicaragua a long period of peace, broken in 1893 by a struggle for the presidency, which in turn led to war with Honduras, owing to the unwarrantable interference of that state. José Santos Zelaya was inaugurated President in 1894, and under his energetic administration Nicaragua proceeded to annex the Mosquito Territory. This caused strained relations with Great Britain, which demanded compensation for its subjects. In 1895 Nicaragua, Salvador, and Honduras united to form the Greater Republic of Central America, with provisions for the subsequent admission of Guatemala and Costa Rica. A constitution was adopted and went into effect on Nov. 1, 1898; but one month later, owing to the dissatisfaction of Honduras, the union was dissolved. President Zelaya was reëlected in 1898, 1902, and 1906. During his long régime Nicaragua enjoyed comparative peace and prosperity. His long continuance in power, however, created discontent in Nicaragua, and his agressive policy made him a disturbing factor in Central American politics and ultimately brought him into conflict with the other republics and with the United States. In 1907 Zelaya, with the object of forming a Central American confederation under his leadership, brought on war with Honduras, in which he was successful, and then attacked Salvador. Through the influence of Mexico and the United States the Central American republics sent representatives to a peace conference at Washington (Nov. 14–Dec. 20, 1907). The result of this conference was a treaty of peace, and a number of conventions providing for measures to preserve peace among the countries were held. In 1908 a treaty was negotiated with Great Britain, by which the sovereignty of Nicaragua over the Mosquito Coast (q.v.) was recognized. In October of the following year a revolt broke out under the leadership of Gen. Juan J. Estrada. Largely owing to the attitude assumed by the United States in regard to the execution of two American citizens, Groce and Cannon, Zelaya was forced to resign (December) and took refuge in Mexico. José Madriz was then elected to the presidency, but the revolt under Estrada continued. The government forces were successful at first, but in August, 1910, Madriz fled from the capital and Estrada was proclaimed President. He formed a conservative cabinet, suspended the constitution, and proceeded to adjust affairs with the United States and establish a stable government. Estrada was chosen President, by Congress, for a two-year term (Dec. 31, 1910), but resigned the following May and was succeeded by the Vice President, Adolfo Díaz. On Oct. 7, 1911, Gen. Luís Mena, a representative of the old Zelayist faction, was elected to the presidency for a four-year term beginning Jan. 1, 1913. After the adoption of the new constitution (see *Government*) on March 1, 1912, the election of Mena was declared illegal and he was forced out of the cabinet of Díaz. Thereupon he headed a revolt against the government. The United States was called upon to guarantee with its forces the lives and property of American citizens, and 2000 marines were landed, which were withdrawn when the revolt was suppressed and peace restored. Díaz, the conservative candidate, was again elected to the presidency on Nov. 2, 1912. He directed his efforts towards the adjustment of the finances of the nation and the establishment of a stable government. Negotiations were entered into with the United States with reference to an option on the Nicaragua Canal route and other matters concerning the relations of the two countries. A treaty was signed in 1914, which has been ratified by Nicaragua. A new revolt occurred in 1914 and martial law was declared. Serious disorder was prevented, however, by the presence of United States troops, and peace was soon restored.

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NICARAGUA, LAKE. The largest lake of the American continent between Lake Michigan in the north and Lake Titicaca in the south. It lies in the southwestern part of the Republic of Nicaragua and is separated from the Pacific coast by an isthmus 11 miles wide at its narrowest point (Map: Central America, E 5). The lake is oval in shape, with a length of 110 miles, a maximum width of 45 miles, and an area of over 3000 square miles. Its depth is from 10 to 260 feet. It discharges southeastward into the Caribbean Sea through the San Juan River, and receives the water of Lake Managua through the Tipitapa River. The mean elevation of its surface above the sea is now about 106 feet, but seemingly it was considerably greater 70 to 100 years ago. Ancient beaches show that in past ages it was continuous with Lake Managua, and discharged into the Pacific Ocean through the Gulf of Fonseca. The lake is studded with hundreds of islands, the largest of which, Ometepe, has two active volcanoes. For the proposed interoceanic waterway through Lake Nicaragua, see NICARAGUA CANAL.

NICARAGUA CANAL. A proposed ship canal across the territory of Nicaragua, by way of Lake Nicaragua, connecting the Atlantic and Pacific oceans. The question of interoceanic communication across Central America first began to occupy the attention of the United States shortly after the establishment of the independence of the Spanish American republics. It formed one of the proposed subjects of discussion at the Panama Congress of 1826, Henry Clay, then Secretary of State, instructing the commissioners from the United States to investigate "the practicability and the probable expense of the undertaking on the routes which offer the greatest facilities." In March, 1835, the Senate instructed the President to open negotiations with the governments of Central America and New Granada with a view to affording protection to any individuals or companies that should undertake to construct a canal connecting the Atlantic and Pacific oceans, and for insuring the free and equal navigation of the canal by all nations. During the administrations of Presidents Jackson and Van Buren commissioners for the purpose were successively appointed, one of whom reported in favor of the Nicaragua route. The interest of the United States in the project was increased by the establishment of a British protectorate over the Mosquito Coast (q.v.) and the acquisition of California and the subsequent discovery of gold there. Prior to the Mexican War (1846–48) the United States had no Pacific coast of importance, and the title to that part which it did possess was disputed by Great Britain. The acquisition of California therefore completed the Pacific coast of the United States as it now stands. From that time on the Nicaragua Canal as a transisthmian waterway became of great national interest as a means of convenient communication between the two coast lines. In 1849 the government of Nicaragua granted to a company, of which Cornelius Vanderbilt was the chief member, the right to construct a ship canal across the territory of that state. This concession lapsed in 1856 on account of the nonfulfillment of the conditions. In the same year in which the Vanderbilt concession was granted, Mr. Hise, the chargé d'affaires of the United States in Nicaragua, concluded, without authority from his government, a treaty with Nicaragua, by which the United States received a grant of perpetual and exclusive right of way for the construction of a canal across the Isthmus, and with full jurisdiction over the same, in spite of the British claim to the Mosquito Coast. In return the United States agreed to guarantee the integrity of Nicaragua and forever protect her in the exercise of all her sovereign rights. The treaty did not meet with the approval of President Taylor, and accordingly was not submitted to the Senate, although it was held for a time as a means of influencing the action of Great Britain in the negotiations then in progress for settlement of the controversy in regard to the Mosquito protectorate.

It was now generally believed that the Nicaragua route was the most feasible for the construction of a ship canal, but the claim of Great Britain to the territory around the mouth of the San Juan River, the proposed eastern terminus, was an obstacle to the United States. It was felt to be too serious an undertaking to dislodge her from this position, and it was therefore resolved to negotiate with a view to securing her coöperation in guaranteeing the neutrality of the proposed canal. This was accomplished by the so-called Clayton-Bulwer Treaty (q.v.) of 1850. (For the abrogation of this treaty in 1901, see HAY-PAUNCEFOTE TREATY; PANAMA CANAL.) In the same year Orville Childs, a civil engineer, completed the survey of a route for the proposed ship canal and made a favorable report on the feasibility of the undertaking. The Vanderbilt Company in the meantime had secured a new concession for the construction of a canal in accordance with the survey made by Colonel Childs; but this was soon revoked by the government of Nicaragua, chiefly on account of the Walker filibustering expedition, which had for its object the conquest of Central America. The outbreak of the Civil War arrested further progress towards the construction of the canal, but in 1867 the project was again taken up, and in June a treaty was concluded between the governments of the United States and Nicaragua, by which the citizens of the United States acquired the right of free transit over any canal constructed under the authority of the government of Nicaragua, but the right of the United States or its citizens to construct the canal was not conceded. During the 10 years following 1872 almost every possible route across the Isthmus was carefully surveyed by officers and engineers of the United States navy. In March, 1872, President Grant appointed, in compliance with a resolution of the Senate, a commission of three eminent military and naval engineers to investigate the subject of an Isthmian canal, and these unanimously reported, Feb. 7, 1876, in favor of the Nicaragua route, by way of the San Juan River from Greytown and Lake Nicaragua, terminating at Brito on the Pacific coast.

In May, 1879, an international congress was held at Paris to determine the location of the interoceanic canal. The merits of the Nicaragua route were ably advocated by the delegates from the United States, but the congress decided in favor of the Panama route. (See PANAMA CANAL.) In 1884 a treaty was concluded between the United States and Nicaragua, by which the United States agreed to build a canal to be owned jointly by the two powers, the United States agreeing furthermore to protect the integrity of Nicaragua. When Cleveland became President, the treaty was still unratified, and he withdrew it from further consideration by the Senate. He declined to resubmit it on the ground that the construction and ownership of the canal under such circumstances would be "inconsistent with its dedication to universal and neutral use" and would "entail measures for its realization beyond the scope of our national polity or present means." In the meantime a scheme had been set on foot, chiefly by leading capitalists of New York, to construct by private enterprise a canal through Nicaragua. In April, 1887, under the name of the Nicaragua Canal Association, they secured from the government of Nicaragua a concession granting the exclusive privilege of constructing and operating the canal. Surveys were at once begun by a corps of competent engineers, and the final location of the route was soon determined upon. In February, 1889, Congress granted the company a charter of incorporation with a capital of $100,000,000, with authority to increase the amount to $200,000,000. In June, 1889, the preliminary work of construction was begun at Greytown, and in the following October the actual work of excavation began. The route finally determined upon was to begin at Greytown on the Atlantic and end at Brito on the Pacific coast, about 170 miles distant. The company erected large storehouses, hospitals, and other buildings at Greytown, established the necessary railroad and telegraph service, and landed large quantities of machinery, tools, lumber, and other materials. Within a period of about one year $2,000,000 had been expended. In 1893 the company ceased operations owing to lack of funds, a fruitless effort having been made to induce Congress to guarantee the principal and interest at 4 per cent of an issue of $100,000,000 of canal company bonds, to be issued for construction purposes. In 1895 Congress provided for the appointment of three engineers, viz., Col. William Ludlow, U.S.A.; M. F. Endicott, C.E.; and Alfred Noble (collectively known as the Ludlow Commission), to investigate and report upon the feasibility and cost of completing the work already begun by the company. They reported in favor of the feasibility of the project, estimating the cost at $133,472,893, as against the company's estimate of about half that amount. In view of the small appropriation made by Congress, and the consequent impossibility of making an exhaustive investigation, the commission advised a more thorough investigation with a view to the possible discovery of a more advantageous route.

Congress then provided for a new commission, popularly known as the Walker Commission, to continue the investigation with a view of making complete plans for the entire work of constructing the canal. The members selected were Rear Admiral John G. Walker, U.S.N.; Prof. Lewis M. Haupt, C.E.; and Col. P. C. Hains, U.S.A. With a large corps of engineers, geologists, and other experts, the commission visited Nicaragua in December, 1897, and made a full examination of the topographical, geological, and hydrographic conditions of the country, reporting in May, 1899, that in their judgment the cost of constructing the canal from Greytown to Brito, by way of the Lull route east of the lake and by way of the Childs route west of it, would not exceed $118,113,790. Colonel Hains, who concurred in the report, estimated the cost at $134,818,308. In the meantime, interest in the old Panama Canal project having been aroused on account of the favorable report of an international commission of experts, it was decided that nothing further should be done towards the construction of a canal by way of the Nicaragua route until the whole question of canal possibilities had been investigated by a larger commission of experts. Congress accordingly, in March, 1899, provided for a new commission to undertake the task of "finding the route." The members appointed by President McKinley were Rear Admiral Walker, Colonel Hains, and Professor Haupt of the Nicaragua Commission; ex-Senator Pasco of Florida, Alfred Noble, C.E., George S. Morrison of New York, Prof. W. H. Burr of Columbia University, Lieut. Col. O. H. Ernst, U.S.A., and Prof. Emory R. Johnson of Pennsylvania. After an exhaustive investigation of all the proposed routes on the entire Isthmus from Nicaragua to Colombia, the commission reported (November, 1901) unanimously in favor of the Nicaragua route as "the most practicable and feasible," chiefly on account of the difficulties experienced in negotiating with the Panama Canal Company. Immediately after the report was made public, however, the Panama Company was reorganized, and it then offered to sell its property and franchises to the United States for $40,000,000, the valuation which the Canal Commission had placed upon the entire property and the rights and franchises of the company. The commission thereupon in a supplementary report recommended the acceptance of the offer. Already in May, 1900, the House of Representatives had by a vote of 225 to 35 passed a bill for the construction of a canal by way of the Nicaragua route, which, however, the Senate had refused to accept. In January, 1902, the House repassed this bill by a vote of 307 to 2. Shortly thereafter came the supplementary report of the Canal Commission recommending the purchase of the Panama Company's property and franchises. This led the Senate to hold up the House bill for further consideration of the Panama scheme. Finally it refused to accept the Nicaragua plan, and after three months of debate the two Houses, largely influenced by the volcanic occurrences in the Caribbean region, agreed upon the Panama route, with the understanding that the Nicaragua route should be reverted to in case a satisfactory title could not be secured to the Panama property and the necessary territory from the government of Colombia. In such case the President was authorized to begin negotiations with the government of Nicaragua for the necessary concessions, and to construct the canal at a cost not exceeding $180,000,000. In 1915 the Panama Canal was so nearly completed that much traffic was passing through it. The completion of this great work, however, did not eliminate all interest in the Nicaragua route. The Federal government negotiated a treaty with the government of Nicaragua for the purpose of securing the exclusive right in the future to construct a ship canal across Nicaragua if that procedure should at any time appear to be advisable. Under this treaty the government of Nicaragua would receive $3,000,000 for the canal option and for a naval station in the Gulf of Fonseca. Up to April, 1915, the Senate had failed to ratify the treaty, although it was still before that body for consideration.

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NICARIA, nē'kȧ-rē'ȧ, or **ICARIA**. An island off the west coast of Asiatic Turkey, a short distance west of Samos (Map: Balkan Peninsula, F 6). It formerly belonged to Turkey, but was taken by Greece after the Balkan wars of 1912–13. Area, about 83 square miles. It is mostly mountainous, rising over 3000 feet above the sea, and is devoid of good harbors. Wood is one of the chief products. The inhabitants, who number about 10,000, and of whom about 9500 are Greeks, are chiefly engaged in the production of charcoal and in sponge fishing.

NICASTRO, nė-kä'strȯ. An episcopal town in the Province of Catanzaro, Italy, beautifully situated at an altitude of 970 feet, with a view of the distant gulfs of San Eufemia and Squillace, near the sea, 16 miles west-northwest of Catanzaro (Map: Italy, F 5). Its castle was the prison of Henry II's son. The town has a trade in wine and oil. There are hot springs in the vicinity. Pop. (commune), 1901, 17,524; 1911, 17,204.

NICCOLINI, nĭk′kô-lē′nē, GIOVANNI BATTISTA (1782–1861). An Italian poet, born at San Giuliano, near Pisa, October, 1782. He studied at Florence and took his degree in law at the University of Pisa. In 1802 he took a government clerkship; from 1804 to 1807 he was in the office of the Archivio delle Riformagioni, and from 1807 until his death he was professor of history and mythology, secretary and librarian in the Accademia di Belle Arti at Florence, and for a while also librarian of the Palatine Library. His critical and historical treatises, many of them produced in connection with his academic labors, constitute the less important part of his work. As a poet he attained to greatest excellence in tragedy, but he also revealed no little force in his lyrics (*Poesie nazionali,* 1859; *Pensieri poetici,* 1860; *Canzoniere nazionale e poesie varie,* 1863; *Canzoniere civile,* 1884; *Versi inediti,* 1888) and in his translations from Æschylus, Euripides, and Ovid. In his dramas of the earlier period (*Polissena, Ino e Temisto, Edipo,* and *Medea*) he adhered to the classic Greek model. The *Nabucco* (1816; published at London, 1819) was his first political drama, and it assailed absolute power of all kinds. Another manifesto against absolute power is the *Antonio Foscarini* (performed in 1827), the most popular of his tragedies. His *Beatrice Cenci* should be compared with that of Shelley. The *Giovanni da Procida* (1817; performed in 1830), like the *Lodovico Sforza* (1834), advocated the unity and independence of Italy. There is no political intention discernible in the *Rosmunda d' Inghilterra* (performed in 1838), but his masterpiece, the *Arnaldo da Brescia* (1843), again proclaims the sovereignty of the people over Imperial and ecclesiastical power, and attacks especially the temporal power of the church, for Niccolini believed with Dante, Machiavelli, and Alfieri, that Italy would never rise through the work of a pope. The fundamental ideas of the *Arnaldo* reappear in *Filippo Strozzi* (1847). His plays, with all their merits, are lyric rather than dramatic in spirit. As a scholar and member of the Crusca he upheld the Tuscan above the other dialects, advocating neither pedantry nor license. Consult: the edition of his *Opere* prepared by himself and first published at Florence (1844); also the *Opere edite e inedite,* an edition by Gargiolli (10 vols., Milan, 1863–80); Vannucci, *Ricordi della vita e delle opere di Giovanni Battista Niccolini* (Florence, 1866); Ostermann, *Il pensiero politico di G. B. Niccolini* (Milan, 1900); Baldini, *Il Teatro di G. B. Niccolini* (Florence, 1907).

NIC′COLITE. A nickel arsenide of pale-red metallic color, which often accompanies cobalt and silver ores.

NIC′COLO. See GEMS.

NICCOLÒ ALUNNO, ȧ-lōōn′nô (c.1430–1502), properly called Niccolò da Foligno from his native town, or Niccolò di Liberatore after his father. An Italian painter of the early Renaissance, the founder of the Umbrian school. He was born at Foligno, was a pupil of Benozzo Gozzoli, and was at a later period influenced by Carlo Crivelli. As the first to reveal fully the emotional Umbrian temperament, in its strange combination of passion and mysticism, he may be termed founder of the school which culminated in Raphael. He had good feeling for line and color and some skill in rendering movement. His principal works include an "Enthroned Madonna" (1465) in the Brera, which has seven other paintings by him, and his largest altarpiece, a polyptych representing the "Coronation of the Virgin" (1466) in the Vatican. Others are a processional standard representing the "Annunciation" (1466) in the Pinacoteca of Perugia, a panel in two compartments at Karlsruhe, altarpieces at Gualdo-Tadini (1471) and in the Villa Albani, Rome, and a triptych in the cathedral of Assisi, of noble yet free composition. In his native town there are four paintings by him. From an inscription on one of them, the altarpiece of San Niccolò, "Nicolaus Alumnus Fulginiæ," i.e., "Nicholas, a native of Foligno," Vasari erroneously christened him Alunno, by which name he is generally known.

NICCOLÒ D' AREZZO, ȧ-rĕt′sô (?1353–1420), also called Niccolò Lamberti and Niccolò di Piero. An Italian sculptor and architect of the early Renaissance. He was born at Arezzo, where some of his early sculptures, notably a lunette of the "Madonna" for the façade of the cathedral, are still extant, though in bad preservation. After 1388 he was frequently employed to work for the cathedral in Florence, and from 1402 to 1408 collaborated with Antonio and Nanni di Banco in the decoration of the north portal. His other authentic works in the cathedral are statues of the "Virgin" (1394) and "Christ" (1396), a colossal "St. Mark" (1415), and a group of the "Annunciation" in the Opera del Duomo. He also helped to decorate Or San Michele, Florence, and was employed in Prato. Though still hampered by Gothic traditions, he strove after greater realism, freedom, and elegance of style, and was the first to introduce the new art of Florence into Venice and Lombardy. No authentic works of his survive outside of Tuscany.

NICCOLÒ DE' NICCOLI, nĕk′kô-lō′ dȧ nĕk′-kô-lē (1363–1437), or more often Niccoli Niccolò. An Italian classical scholar, born in Florence. He was a collector of coins and particularly of Greek and Latin manuscripts. These he procured from every possible source, and often copied them with his own hand. In his fine house in Florence he entertained the élite of the literary and artistic society of the day, as well as humble students, and was looked upon as the supreme authority in all matters of letters. Even the most famous scholars feared his caustic tongue. After his death Cosmo de' Medici bought his manuscripts and made them the foundation of the present Laurentian Library of Florence. Consult J. E. Sandys, *A History of Classical Scholarship,* vol. ii (Cambridge, 1908).

NICE, nēs. A city in Bithynia. See NICÆA.

NICE, It. NIZZA. The capital of the Department of Alpes-Maritimes, France, situated on the Mediterranean, at the foot of the Alps and at the western extremity of the Riviera, 140 miles by rail east-northeast of Marseilles and 640 miles from Paris (Map: France, S., M 5). Nice is far famed as a place of sojourn for health seekers, some 15,000 of whom visit it yearly. The city and its bay are protected by the mountains on the north. The climate is dry, mild, and invigorating. It is warm in winter and not hot in summer. Mean annual temperature 58.6° F. (January 45.4°, July 73.8°). Frost and snow are rare. The rainy period is in the fall. The fashionable season begins soon after January 1 and lasts till

June 1. The situation of Nice, where the small Paillon (Paglione) empties into the sea, is splendid. There is a circle of forts in the rear, and the city is important strategically. On the left bank of the covered stream is the little old town, with narrow, crooked streets. In this section a mixture of Provençal and Italian is spoken. Along the sea front here extends a fine boulevard. At its east end rises Castle Hill, on which runs a promenade, whence a wide and admirable view of the coast may be had. Beyond the hill lies the city's small harbor, called Limpia.

On the western bank of the Paillon is the more important foreigners' quarter, where French is the universal language. In this section the avenues are spacious and beautiful, with plane trees and eucalypti, and the city presents the delightful appearance of a southern sea resort. The centre of life in this part is the Place Masséna, on which stands the bronze statue to Masséna, who was born in Nice. Adjacent is the Casino, an attractive modern municipal structure, containing gaming rooms, a theatre, and an entertainment garden. From the Casino the Public Garden, exceptionally attractive with its palm, pepper, myrtle, and laurel trees, reaches to the sea and terminates in the splendid iron and glass pier promenade. From this point west along the bay for a distance of over 2 miles is the wide, magnificent Promenade des Anglais, flanked by villas and spacious hotels and having gardens of orange and lemon trees and acres of flowers. Among the objects of interest in the city are a marble cross, commemorating the meeting here of Francis I and Charles V in 1538; the modern centenary obelisk in honor of the union of Nice with France in 1792; a pyramid to the memory of Garibaldi, a native of Nice; also a statue of him and a bust of President Carnot.

Among the churches are the Roman Catholic cathedral (1650) and the Gothic Notre Dame de Vœu (1835), with two towers 213 feet high. The public library has about 60,000 volumes. The Museum of Natural History is noteworthy for its collection of mushrooms. The municipal museum contains mediocre works of modern French artists. Nice has a nunnery, a lyceum, a priests' and a teachers' seminary, a charity hospital, and an important astronomical observatory (on Mont Gros), with one of the largest refractors in the world. The municipal theatre has good opera in the season. The carnival, an elaborate fête of flowers and confetti, is an annual occurrence which attracts pleasure seekers from all countries. To the north of Nice 2½ miles lies Cimiez, with its interesting Roman remains. Nice exports oranges, lemons, flowers (for which it is celebrated), perfumes, olives, oils, and liquors. It also manufactures ivory goods, furniture, silk, dyes, etc. Some marble is quarried near. The city shows a marked increase in commercial importance and in population. Pop. (commune), 1901, 105,109; 1906, 134,232; 1911, 142,940. In the latter year the agglomerated population, exclusive of military, criminal, etc., counted apart, was 109,547.

Nice was the Nicæa of the ancients and dates from the fourth century B.C., when it was settled by Phocæans from Marseilles. It suffered in many wars and at the hands of many races. It belonged in the late Middle Ages to Provence, and finally passed to Savoy. The French took it in 1792; it was given back to Sardinia after the fall of Napoleon, and became again a part of France in 1860. It suffered severely from an earthquake in 1877. Consult: Hole, *Nice and her Neighbors* (London, 1881); Henri Moris, *Nice* (Paris, 1896); Ulmès, *Nice et ses environs* (ib., 1903); J. D. E. Loveland, *Romance of Nice* (New York, 1912); Robert de Souza, *Nice, capitale d'hiver* (Paris, 1913).

NICE, COUNCILS OF. See NICÆA, COUNCILS OF.

NICENE (nī'sēn *or* nī-sēn') **CREED**, THE; frequently called the Nicæno-Constantinopolitan Creed. The most important ancient formula of the Christian faith and the only one which approaches ecumenical authority. Since the fifth century it has commonly been believed that this creed was adopted at the Council of Nicæa (325) and reaffirmed at Constantinople (381), but this view is certainly wrong. The creed in question is practically identical with one given by Epiphanius, in his *Ancoratus* (374), which in turn draws its material from Cyril of Jerusalem (*Catechetical Lectures*, 347) and from the symbol actually adopted at Nicæa. The original Nicene formula was drawn up to combat Arianism (see ARIUS) and was based upon a creed which had long been used in Cæsarea. Its leading characteristic was that, in defining the orthodox doctrine of the Trinity, it asserts the consubstantiality of the Son with the Father, i.e., that both are of the same essence or substance. (See HOMOOUSION.) Our so-called Nicene Creed is longer and more symmetrical in construction than the one actually adopted at Nicæa. That ended with, "I believe in the Holy Ghost," after which was appended condemnations of the Arian position. In the article on the Holy Spirit the Eastern Church has always used the form which reads, "And [I believe] in the Holy Ghost, . . . who proceedeth from the Father," whereas the Western Church says, "Who proceedeth from the Father and the Son." This difference has proved a prolific source of controversy. (See FILIOQUE.) The Nicene Creed finds a place in the liturgies of the Greek, Roman, and Anglican churches, and its doctrinal teaching has been accepted by most Protestants. See ATHANASIUS; CHRISTOLOGY; NICÆA, COUNCILS OF.

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NICEPH'ORUS, nī-sĕf'ô-rŭs (Lat., from Gk. *Νικηφόρος*, *Nikēphoros*) (c.758–829). Patriarch of Constantinople, active in the controversy on iconoclasm (q.v.). He was born in Constantinople, the son of Theodore, Imperial secretary of Constantius Copronymus. He first held high office at court. In 787 he was present as Imperial commissioner at the Nicene Council, where, in defense of image worship, he opposed the iconoclasts. This zeal for image worship he inherited from his father. Soon after his return to the capital he retired to a convent, whence in 806 he was called to be Patriarch of Constantinople and was ordained and made Bishop on the same day. Leo the Armenian, who became Emperor in 813, passed an edict in 814 against the worship of images; but neither menaces nor entreaties could induce Nicephorus to assent to it. He became unpopular at court, and in the ensuing year was deposed and withdrew to the convent of St. Theodore, which he himself had founded, and remained there till his death in 829. He published several valuable ecclesiastical works, characterized by great beauty of style, and historical productions distinguished for accuracy, discernment, and erudition. The most important are *Breviarium Historicum*, an historical abridgment, and *Chronographia Brevis*, a short chronicle of events from the beginning of the world to the author's time, with the series of kings, emperors, patriarchs, bishops, etc. The best edition of both treatises is by De Boor, *Nicephori Constantinopolitani Opuscula Historica* (Leipzig, 1880). They are also published, with two apologies for images and a life, in Migne, *Patrologia Græca*, c. Nicephorus is numbered among the saints in both the Greek and the Roman Catholic churches, and his day is March 13.

NICEPHORUS I (died 811). Byzantine Emperor from 802 to 811. He overthrew the Empress Irene, whose Minister of Finance he had been. He was cruel and tyrannical, and the heavy taxes he imposed made him unpopular. He waged war against Harun al Rashid, but was unsuccessful and had to conclude a disgraceful peace in 806. He also tried to check the Bulgarians and, though successful at first, was finally defeated and slain at Marcellæ on July 25, 811. Consult Edward Gibbon, *Decline and Fall of the Roman Empire*, edited by J. B. Bury, vol. v (London, 1909–12).

NICEPHORUS II PHO′CAS (c.913–969). Byzantine Emperor from 963 to 969. He was the descendant of an illustrious race and distinguished himself during the reigns of Constantine VII and Romanus II. In 961 he recaptured Crete from the Saracens and after the death of Romanus was proclaimed Emperor and married Theophano, the widow of his predecessor. As Emperor, Nicephorus waged successful war against the Mohammedans; in 964–966 he conquered Cilicia and in 969 captured Antioch and brought home as a trophy the sword of Mohammed. He was also successful against the Bulgarians, but in the west he was unsuccessful in his wars. The numerous wars, however, necessitated increased taxes, and Nicephorus speedily became unpopular. He was finally murdered by his wife's lover, John Zimisces, who ascended the throne. It was during this reign that Liutprand (q.v.) came to Constantinople on an embassy from Otho I. Consult G. L. Schlumberger, *Un empereur byzantin au dixième siècle: Nicéphore Phocas* (Paris, 1890), and Edward Gibbon, *Decline and Fall of the Roman Empire*, edited by J. B. Bury, vols. v, vi (London, 1909–12).

NICEPHORUS III BOTANIA′TES (died 1081). Byzantine Emperor from 1078 to 1081. He belonged to the same family as Nicephorus II and had distinguished himself as general under Constantine X (XI), Ducas, and Romanus IV. When, during the reign of the weak Michael VII, Nicephorus Bryennius was proclaimed Emperor by the European legions, Nicephorus Botaniates immediately had himself nominated as Emperor by the Asiatic troops. The latter was successful, through the aid of the Sultan Solyman, and was crowned on April 3, 1078. His reign was fairly successful, but he quarreled with his general, Alexius, and in consequence he had to abdicate and retire to a monastery in April, 1081, where he died a few months later. Consult Edward Gibbon, *Decline and Fall of the Roman Empire*, edited by J. B. Bury, vols. v, vi (London, 1909–12).

NICE′TAS CHONIATES, kō′nĭ-ā′tēz (Lat., from Gk. *Νικήτας Χωνιάτης*, *Nikētas Chōniatēs*), or Acominatus (c.1145–c.1215). A Byzantine historian born at Chonæ, the ancient Colossæ. He held high office under the Byzantine emperors during the last years of the twelfth century. Nicetas was in Constantinople when the city was captured by the Latins (1204), but escaped to Nicæa. His history of the Greek emperors from 1180 to 1206 completes Zonaras and is an excellent authority. It is best edited by Bekker (Bonn, 1835). A valuable description of the statues in Constantinople destroyed by the Latins may have been originally composed by Nicetas; in its present state it seems to have suffered additions by a later author. It is in the Bonn edition. Consult Karl Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897), and Edward Gibbon, *Decline and Fall of the Roman Empire*, edited by J. B. Bury, vols. v, vi (London, 1909–12).

NICHE, nĭch (Fr. *niche*, from It. *nicchia*, niche in a wall like the hollow of a shell, from *nicchio*, shell, niche, from Lat. *mitulus*, *mytilus*, *mytulus*, mussel, from Gk. *μύτιλος*, *mytilos*, *μίτυλος*, *mitylos*, mussel, from *μῦς*, *mys*, mouse). A recess formed in a wall, commonly for the purpose of containing a statue or some ornamental figure or piece of furniture. In classical architecture, the niches are generally semicircular recesses covered by small half-domes, often with a shell ornament. The finest examples are the seven great niches in the interior of the Pantheon at Rome. In Gothic architecture, the niche is a frequent and characteristic feature, the opening being arched and capped with a highly ornate and complex canopy of gables and pinnacles. In the Mohammedan mosque the direction (called kiblah, q.v.) of Mecca, the sacred city, is marked by a niche called mihrab. See Mosque.

NICHIREN, nĭch′ĭ-rĕn (1222–82). A Japanese religious teacher and the founder of an influential sect of Buddhists, the Hokkes. He was born in Kominato in the Province of Awa. He completed the prescribed studies at an early age, was admitted to the priesthood and became a violent and bitter sectarian. So severe were his attacks upon all other forms of Buddhism that he was banished for a time, and later was condemned to death on the charge of teaching doctrines subversive of the government. His life was saved by a miracle, but he was again banished. Possessed, as it is said, of miraculous powers, he gained large numbers of followers, and founded the sect which is popularly known by his name. But he brought to Buddhism a spirit of intolerance and bitter persecution far other than the spirit of its founder. The sacred book of the sect is the Sanskrit Saddharma Pundarīka, which has been translated into English by Kern in Max Müller, *Sacred Books of the East*, vol. xxi (Oxford, 1884).

NICHOL, nĭk'ol, John (1833–94). An English scholar, son of John Pringle Nichol. He was born in Montrose, Scotland, and was educated at the University of Glasgow (1848–55) and at Balliol College, Oxford (1855–59). In 1865 he visited the United States, where he became acquainted personally with Emerson and Longfellow. He was made LL.D. by St. Andrews (1873); was professor of English literature at Glasgow (1862–89); lectured in Scotland and England; advocated Broad Church doctrines; and took the side of the North in the American Civil War. He died Oct. 11, 1894. Nichol contributed to the *Westminster, North British,* and other reviews; was one of the writers on the *Encyclopædia Britannica;* and published *Fragments of Criticism,* a volume of essays (1860); *Hannibal,* a classical drama (1872); *Byron,* in the "English Men of Letters Series" (1880); *American Literature: An Historical Review* (1882); *Robert Burns* (1882); *Landmarks of English Literature* (1882); *Lord Bacon's Life and Philosophy* (1887–89); *Carlyle,* "English Men of Letters Series" (1892); and several educational treatises. Consult the *Memoir* by Knight (Glasgow, 1896).

NICHOL, John Pringle (1804–59). A Scottish astronomer, born at Huntly Hill, near Brechin, in Forfarshire. Educated at King's College, Aberdeen, he engaged in preaching before he was of age, but his fondness for scientific studies led him to give up the ministry. He was editor of the *Fife Herald,* and later headmaster of Cupar Academy, which position he resigned to become rector of Montrose Academy (1827). He was appointed, in 1836, regius professor of astronomy in the University of Glasgow. In this capacity he effected the equipment and transference of the Glasgow Observatory to its present site on Dowanhill. His astronomical work was directed chiefly to the physical features of the moon, and to the nebular theory. In one of his works he made the earliest suggestions for the study of sun spots by photography. He visited the United States in 1848 and lectured publicly on scientific subjects. He was a fellow of the Royal Astronomical Society and a member of the Royal Society. Among his works may be mentioned: *Views of the Architecture of the Heavens* (1838 and nine subsequent editions); *Contemplations on the Solar System* (1844); *Exposition and History of the Planet Neptune* (1848); *The Stellar Universe* (1848); *The Planetary System, Its Order and Physical Structure* (1851); *A Cyclopædia of the Physical Sciences* (1857). Consult Maclehose's *Hundred Glasgow Men* and Stewart's *University of Glasgow, Old and New.*

NICHOLAS, nĭk'ŏ-las. The name of five popes.—Nicholas I, Saint, Pope, 858–867. He was of a noble Roman family and was employed in important affairs by Benedict III, whom he succeeded, being crowned—the first recorded instance of the coronation of a pope—in the presence of the Emperor Louis II. The most important events of his pontificate are those connected with his conflict with Photius, who had been illegally intruded into the see of Constantinople. (See Photius; Greek Church.) Throughout his reign he was one of the most uncompromising upholders of the claims of the Roman see to universal jurisdiction. A prolonged contest in practical matters with a Western prelate of great power and individuality, Hincmar, Archbishop of Rheims, was terminated by Hincmar's submission. The matrimonial affairs of the German princes also gave him much trouble; and his firmness in upholding the sanctity of the marriage tie brought him into conflict with the Emperor, who marched upon Rome and held the Pope a prisoner without food for two days in the castle of Sant' Angelo, until, terrified by a sudden illness and by some fatalities which befell his followers, he drew off his forces and made peace. Nicholas brought the new Slavonic church, just growing up through the preaching of Cyril and Methodius (q.v.), under the control of the papacy. Altogether he was one of the most vigorous of the early popes, one who laid the foundations upon which Gregory VII could build; an impressive figure, who may stand with Charlemagne to close the centuries of formation and preparation, and open the Middle Ages. Consult: H. Lämmer, *Papst Nikolaus I. und die byzantinische Staatskirche seiner Zeit* (Berlin, 1857); Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages,* vol. iii (trans. from 4th Ger. ed., London, 1895); Jules Roy, *Saint Nicholas I* (Paris, 1898; Eng. trans., London, 1901); Mandell Creighton, *History of the Papacy,* vols. i, ii (ib., 1902–04); H. K. Mann, *Lives of the Popes in the Early Middle Ages,* vol. iii (ib., 1906); Anton Greinacher, *Die Anschauung des Papst Nikolaus I. über das Verhältnis von Staat und Kirche* (Berlin, 1909).

Nicholas II (Pope, 1059–61), Gerhard by name, a Burgundian by birth. He was a canon of Liége and in 1046 became Bishop of Florence. When, on the death of Stephen X in 1058, the so-called Tusculan faction of the Roman nobility chose the Bishop of Velletri Pope under the name of Benedict X, Hildebrand induced an assembly at Siena in December to elect Gerhard. The Empress Agnes espoused his cause, and he entered Rome in January. Hildebrand became archdeacon of the Roman church in the latter part of the same year (1059), and was the soul of the entire pontificate of Nicholas. (See Gregory VII.) Under his influence and that of Peter Damiani stringent measures were enforced against simony and concubinage; the papal election was also definitely restricted to the College of Cardinals, and the whole tendency of Nicholas' administration was to free the Church from the invasion of external influences. He died in Florence, July 19, 1061, and was buried in his former cathedral. Consult: Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages,* vol. iv (trans. from 4th Ger. ed., London, 1896); H. H. Milman, *History of Latin Christianity,* vol. iii (New York, 1903); H. K. Mann, *Lives of the Popes in the Early Middle Ages,* vol. vi (London, 1910).

Nicholas III (Giovanni Gaetano degli Orsini). Pope, 1277–80. He was made Cardinal by Innocent IV in 1244 and employed by several popes in important diplomatic missions. On the death of John XXI he was elected at Viterbo after a prolonged division in the conclave, which was only terminated by the citizens locking the cardinals up in the town hall. He had already acted as mediator between Charles of Anjou and Rudolf of Hapsburg, and now employed his influence with them to strengthen materially the temporal power of the Church in Italy. He is described as a man of strict morals and considerable learning, though the reproach of nepotism is brought against him. He sent missionaries to Persia and to China (1278). Consult: Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, vol. v (trans. from 4th Ger. ed., London, 1897); H. H. Milman, *History of Latin Christianity*, vol. vi (New York, 1903).

Nicholas IV (Pope, 1288–92), Girolamo Masci by name. He entered the Franciscan Order at an early age and in 1272 was sent to Constantinople to invite the Greeks to the Council of Lyons. Two years later, on the death of St. Bonaventura, he was elected general of his order. Nicholas III made him Cardinal, and Martin IV Bishop of Palestrina. After nearly a year's interregnum he was chosen to succeed Honorius IV and was the first Franciscan Pope. In his time Acre, the last stronghold of the Christians in the East, fell into the hands of the Moslems; and he made vigorous attempts to stir up Christendom to renewed efforts against them, also making strenuous endeavors to convert the Tatars. Consult: Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, vol. v (trans. from 4th Ger. ed., London, 1897); H. H. Milman, *History of Latin Christianity*, vol. vi (New York, 1903).

Nicholas V (Tommaso Parentucelli). Pope, 1447–55. Born probably at Sarzana, near Pisa, in 1397, he was educated at Bologna and Florence. In 1426 he came to Rome and was employed in the ecclesiastical service. In 1444 he was made Bishop of Bologna and Cardinal two years afterward in recognition of his skill in conducting difficult negotiations in Germany. On succeeding three months later to the papal throne, he addressed himself first to the settlement of the troubles growing out of the Council of Basel, and prevailed upon the Antipope Felix V to resign his claims, thus securing universal recognition in 1449 and restoring peace to the Church. In 1452 he crowned Frederick III as Emperor—the last Imperial coronation to take place in Rome. He sought to stir up Christendom to oppose the advance of the Turks. He reproached the Greeks with their dilatory postponement of the agreements made at the Council of Florence, and upon the Greek Emperor finally accepting his conditions, sent Cardinal Isidore to Constantinople with troops and money. The submission of the Greeks was, however, only feigned; and on May 29, 1453, Constantinople fell into the hands of the Mohammedans. In the revival of classical learning which preceded and followed that event Nicholas was actively concerned. He dispatched agents in all directions, east and west, to purchase or to copy every important Greek and Latin manuscript. The number collected by him was about 5000. He remodeled and may almost be said to have founded the Vatican library. He caused translations to be made of the Greek classics, both sacred and profane. He invited to Rome the most eminent scholars of the world, and extended his special patronage to the Greeks, who were driven from Constantinople; in short, he did all in his power to make Rome the centre of the world, both in art and letters. Consult: Mandell Creighton, *History of the Papacy*, vol. iii (London, 1903); H. H. Milman, *History of Latin Christianity*, vol. vii (New York, 1903); Ludwig Pastor, *History of the Popes*, vol. ii (3d ed., London, 1906); Philip Schaff, *History of the Christian Church*, vol. v, part ii (New York, 1910). The name of Nicholas V was also assumed by the Antipope set up by Louis of Bavaria against Pope John XXII in 1328, the Franciscan Pietro Rainalducci di Corbara, who finally made his submission and died at Rome in 1333.

NICHOLAS I (1844–). King of Montenegro. He was educated in Cetinje, Triest, and Paris, returning to Cetinje when about 20 years old. His uncle, Prince Danilo, was assassinated in August, 1860, and Nicholas was immediately proclaimed Prince. In the same year he married Milona, daughter of Peter Valsetitch, president of the Council of State. Danilo Alexander, his eldest son, was born June 29, 1871. Helena, one of his six daughters, became the wife of the Prince of Naples, now Victor Emmanuel III of Italy. He has introduced many reforms in education, the civil administrations, and the army. The period of Nicholas' reign has been one of much moment for Montenegro, which obtained from the European Powers recognition of its independence in the Treaty of Berlin (1878). In 1910 the title of King was conferred on him by a unanimous resolution of the national Skupshtina. When the Balkan wars broke out in 1912 King Nicholas was one of the most enthusiastic of the allies. He wanted to drive the Turk completely out of Europe. He defied the Powers and captured Scutari despite the fact that they blockaded the whole coast of Montenegro. Again in the Great War which began in 1914 he was the first to go to Serbia's aid to repel the Austrian forces from the Balkan Peninsula. He set an example of bravery and self-denial which was closely followed by his troops. He has shown himself on the whole a capable ruler, using for the good of his people the almost absolute power he holds. See. Balkan Wars; Montenegro; War in Europe.

NICHOLAS I, Pavlovitch (1796–1855). Emperor of Russia from 1825 to 1855. He was the son of Paul I and Maria Feodorovna and was born at Tsarskoie Selo July 6 (old style June 25), 1796. His early education was under the direction of his mother, a princess of Württemberg, and of Charlotte von Lieven, a lady from Courland and widow of the Governor-General of Kiev. Nicholas was five years old when his father Paul was murdered and his brother Alexander I (q.v.) ascended the throne. His education thereafter was intrusted to Count M. Lamsdorff, who was ex-Governor of Courland and Director of the Cadets' Corps (Military Academy). In 1816 he traveled in England and on the Continent and also made a tour through the Russian provinces. On July 13, 1817, he married Charlotte, the eldest daughter of Frederick William III of Prussia. The death of Alexander I, in December, 1825, and the previous renunciation by his elder brother, the Grand Duke Constantine (q.v.), of his claims to the throne (1822), made Nicholas Emperor, but he was obliged to meet at the outset a military conspiracy, which was stamped out with ruthless severity—the celebrated rising of the Decembrists. (See Russia.) Capital punishment, abolished by the Empress Elizabeth, was revived, for the purpose of inflicting it upon the leaders of the insurrection. Nicholas, like other czars, showed at the beginning of his reign some zeal for reform; but the spirit died out, giving place to the old despotism, and he became the embodiment of the reactionary spirit of the Holy Alliance. Suspicious of the nobility because of the Decembrist uprising, he extended the field and powers of the bureaucracy and governed the country through obedient officials, ignoring entirely the institutions of the nobility. The guiding ideas of Nicholas I, and through him of all official Russia, were summed up in the famous phrase: Orthodoxy, Autocracy, and National Unity (which meant the complete rule of the dominant Great Russian element of the population). Still in his own way Nicholas I was sincerely devoted to his country and people and undertook a number of changes which he thought would benefit the country. The codification of Russian law, commenced in 1827, was continued and completed in 1846. A reform of the monetary system was begun by which silver was made the only legal tender and the issue of treasury notes introduced. A separate Ministry of Imperial Estates was established and several measures were passed for the purpose of improving the condition of the peasants. A war with Persia began soon after his accession, and was concluded on Feb. 28, 1828, by the Peace of Turkmantchai, which gave Persian Armenia to Russia. Close upon this followed a successful but costly war with Turkey, concluded by the Peace of Adrianople (q.v.) which obtained for Russia another increase of territory, the free navigation of the Danube, the right of free passage between the Black and Mediterranean seas, and the protectorate over Moldavia and Wallachia. The revolutionary agitation of 1830 communicated itself to Russian Poland, where there was a national rising, suppressed after a contest of nine months, which taxed the military resources of the Empire. Nicholas converted the Kingdom of Poland into a Russian province, and began the process of Russification, which has since been in progress. Russia, which had been approaching more closely the standards of western Europe, gradually lost its newer aspect. The press was placed under a strict censorship, and education was directed, not to the development of the people, but to preparation for the work of the state. In the colleges (Gymnasiums) Latin and Greek were given chief attention; in the universities inspectors were appointed for the purpose of watching the students and of reporting their political inclinations. The famous "Third Division" was established to handle the affairs of the secret police which was to spy upon the people and clean the country of individuals with "suspicious" or "dangerous" political ideas. The process of Russification, begun in Poland, was to be carried out all over the Empire, until all the foreign elements were completely Russianized and unified in people and religion. The independence of the mountaineers of the Caucasus was inconsistent with the Emperor's schemes, and war was waged against them with the greatest energy and perseverance, but at the cost of immense sacrifices both of money and lives. Nicholas sought to check the advance of British influence in Central Asia, and to counteract it tried various means, among which was the expedition for the conquest of Khiva in 1839, which ended in disaster. Between 1844 and 1846 he visited England, Austria, and Italy. When the revolution of 1848 broke upon Europe, Nicholas availed himself of the first opportunity to interfere on behalf of its tottering thrones, and sent his troops to aid Austria in the suppression of the Hungarian national uprising. Nicholas was intent on carrying into effect the hereditary Russian designs upon Constantinople, and in 1853 provoked a war with the Sultan; but the opposition of Great Britain and France plunged Nicholas into a much more terrible struggle than he had anticipated. (See Crimean War.) In the course of the war he died at St. Petersburg, March 2, 1855, his death having undoubtedly been hastened by chagrin at the repeated defeats which his arms sustained, and the excessive labor he underwent to repair his losses. He was remarkable for temperance, frugality, and patriotism, but equally so for vanity, ostentation, and narrow-mindedness. Consult: S. M. Schmucker, *Nicholas I* (Philadelphia, 1860); Alphonse Balleydier, *Histoire de l'empereur Nicolas* (2 vols., Paris, 1857); Paul Lacroix, *Histoire de Nicolas I* (8 vols., ib., 1864–75); H. S. Edwards, *The Romanoffs* (London, 1890); Th. Shieman, *Geschichte Russlands unter Kaiser Nikolaus I.* (3 vols., Berlin, 1904–13).

NICHOLAS II (1868–). Emperor of Russia from 1894. The eldest son of Emperor Alexander III and Maria Feodorovna (Princess Dagmar, the daughter of Christian IX of Denmark), he was born at St. Petersburg (Petrograd) May 18 (old style May 6), 1868. He was 12 years old when his grandfather Alexander II was assassinated and Alexander III ascended the throne. In fear of revolutionary conspiracies, Alexander III removed the court to the suburb Gatchina, which, since the days of Paul I, had always borne the stamp of a military camp. In this atmosphere young Nicholas grew up. His education was intrusted at first to an Englishman, Mr. Heath, who knew little about Russia and the Russian people, but who devoted a great deal of time to the physical development of his pupil by means of outdoor sports. At 15, Nicholas was put under the care of General Danilovitch, Director of the St. Petersburg Military Academy, who was entirely respectable but dull and uneducated. The general supervision of the Czarevitch's education was placed in the hands of Pobedonostzev (q.v.), the head of the Holy Synod. Under the guidance of these two men, Nicholas spent most of his time at church ceremonies and military manœuvres and at 18 he joined the regiment of the Hussars of the Guards stationed at Tsarskoie Selo. In 1890–91 the Crown Prince traveled extensively in the East. While in Japan he narrowly escaped assassination by a fanatic who was said to have been enraged at the behavior of Nicholas' companions before an image of Buddha. The blow was warded off by Prince George of Greece, cousin of the Czarevitch. Although he traversed the entire width of the Russian Empire, passing through Siberia along the route of the great transcontinental railway, it must be admitted that Nicholas saw more of entertainments in his honor than of the life of the people. On the death of Alexander III (Nov. 1, 1894), his son succeeded to the throne, and the same month married Princess Alexandra Alix, daughter of the Grand Duke of Hesse. The close family relationship between Nicholas II and King Edward VII aroused a hope, never realized, that the new Czar would inaugurate a more liberal policy than during the reign of Alexander III. Indeed, reactionary influences gained greater hold. Dissatisfaction with the policy of the government became widespread and gave rise to a strong revolutionary movement. But Nicholas showed neither the courage to maintain his autocratic rights nor the resolution to adapt himself to a liberal régime. Concessions made to popular demand were withdrawn arbitrarily.

The first four children born to the Emperor and Empress were girls—the Grand Duchess Olga (born Nov. 3, 1895), Tatiana (born May 29, 1897), Maria (born June 14, 1899), and Anastasie (born June 5, 1901)—all of remarkable personal beauty. But the passionate desire for an heir to the throne prompted the Czar to consult mystics, fortune tellers, and spiritualists. He also took a personal interest in canonizing St. Seraphim in the monastery of the Sarov desert, though for this purpose he had to force the removal of the local bishop, who considered the procedure irreconcilable with the rules of the Church. On July 30, 1904, an heir, the Grand Duke Alexis, was born to the Czar, but the boy's health gave alarm from the first, and many stories were circulated regarding the diseases he was affected with. The real trouble was kept a closely guarded secret. Constant fear was also entertained that he would fall a victim to anarchists. Some who came in close contact with Nicholas II characterized him as a weak and timid man who nevertheless liked to assert himself at times and in matters which seemed vital to him, but were really of slight importance. Others have claimed that he was not merely an instrument in the hands of various cliques but that, fully aware of political tendencies, he was in natural sympathy with the conservative and reactionary elements. For a detailed account of his reign, see Russia, *History*, and consult the bibliography of that article; also: Prince E. E. Oukhtomski, *Voyage en Orient, Grèce, Egypte, Inde, 1890–91, de son altesse impériale le Césarevitch* (Fr. trans. of Russ. text, by Louis Leger, 2 vols., Paris, 1893); Maurice Leudet, *Nicholas II intime* (ib., 1899); Ministry of the Imperial Court, *Des solemnités du saint couronnement, ouvrage publié avec l'autorisation de sa Majesté L'Empereur* (St. Petersburg, 1904); A. G. Gardiner, *Prophets, Priests, and Kings* (London, 1908; new ed., "Wayfarer's Library," ib., 1914); A. Elchaninov, *Czar Nicholas II* (ib., 1913); Maximilian Harden, *Monarchs and Men* (Philadelphia, 1913); Paul Vasili, *Behind the Veil of the Russian Court* (London, 1914); also complete edition of the speeches of Nicholas II, 1894–1906 (St. Petersburg, 1906, in Russian). See also War in Europe.

NICHOLAS, Sir Edward (1593–1669). A minister of Charles I of England, born at Winterbourne Earls, Wiltshire. He was a member of Parliament in 1620–21, 1623–24, and 1627–28, and in 1641 was made Secretary of State and Privy Councilor. He stood high in the confidence of the King. When the Royalist cause was lost, Nicholas went to live in Normandy, but was nominally the secretary of Charles I until his execution. Between 1649 and 1660 he was in constant communication with royalists and tried to serve Charles II as faithfully as he had served his father, but the jealousy of Queen Henrietta Maria prevented him from the exercise of any real power. He had been formally appointed Secretary of State by Charles II in 1654, and accompanied the court in its various changes of residence. Upon the restoration of Charles in 1660 Nicholas was given lodgings in Whitehall, but was compelled by intrigue and his failing health to resign his office in 1662.

NICHOLAS, George (c.1755–99). An American soldier and politician. He was born in Hanover, Va., and graduated at William and Mary College in 1772. He took the patriot side in the Revolution, became captain of the Second Virginia Regiment in October, 1775, major of the Eleventh Virginia Regiment in November, 1776, lieutenant colonel of the same regiment in September, 1777, and resigned from the service in the following November. In 1781, as a member of the Virginia Assembly, he introduced articles of impeachment, founded on charges of incompetency, against Governor Jefferson, but they were not adopted. In 1788 he did much in the Virginia Convention to secure the ratification of the Federal Constitution. He removed to Kentucky in 1790, took the leading part in framing the State Constitution of 1792, and became the first Attorney-General of the State.

NICHOLAS (Nikolai Nikolaievitch, ny-ē-kô-lăy′ ny-ē-kō-lă′yĕ-vĕtsh), Grand Duke (1856–). A Russian general, son of a grand duke of the same name and second cousin of Emperor Nicholas II. He was born at St. Petersburg, Nov. 6, 1856. After graduating from the Nikolaiev Military Academy, he became a member of the Russian General Staff and aid-de-camp to the Czar. Nicholas, who began his career as junior officer of a Hussar regiment in the Russo-Turkish War, received the Cross of St. George and the Golden Sword for bravery in crossing the Balkans and the Danube. During the same campaign he was honored with the Prussian Order *Pour le Mérite*. Thereafter his promotion was rapid. He became lieutenant general (1893), inspector of cavalry (1895), major general of the Guards and President of the Council of Defense (1905), and commander of the military district of St. Petersburg (1906). Deeply interested in military science from both the theoretical and the practical standpoints, Nicholas gave attention especially to the history of European strategy. Several times he went to France to witness the annual manœuvres of the French army. In 1907 the Grand Duke married the Montenegrin Princess Anastasia. This marriage strengthened his interest in Slavic affairs and brought him into greater prominence as a leader of aggressive panslavism. This fact and his influence at the court, as well as his military reputation, were the reasons of his appointment as commander in chief of the Russian army at the outbreak of the European War in 1914. As commander in chief Nicholas won the admiration of his army and gave proof of considerable strategic ability. He was largely responsible for the idea of issuing the manifesto to the Polish people, promising the latter national autonomy. He was superseded in September, 1915, by the Czar. See War in Europe.

NICHOLAS, Saint (?–326 or 352). A highly popular saint of the Roman Catholic church, reverenced with still greater devotion by the Russian church. Of his personal history hardly anything is known with certainty. He is said to have been Bishop of Myra in Lycia and to have taken part in the Council of Nicæa, though the last is very doubtful. With more probability he is referred to a later date, but he certainly lived prior to the reign of Justinian, in whose time several of the churches of Constantinople were dedicated to St. Nicholas. The great popularity of St. Nicholas rests mainly on the traditions, both in the West and in the East, of the many miracles wrought through his intercession. He is regarded in Catholic countries as the special patron of the young and particularly of scholars, also parish clerks, travelers, sailors, and pawnbrokers. As his protection was implored against robbers, these persons came to be called Clerks of St. Nicholas. In England his feast was celebrated in ancient times with great solemnity in the public schools and elsewhere; the supposed day of his death (December 6) is still observed with curious popular ceremonies in Germany. The nearness of his feast to that of Christmas Day led to the confounding of the two, so that we are told that Santa Klaus, a Dutch corruption of the name St. Nicholas, gives the presents of Christmas. In art St. Nicholas is represented as clad in episcopal robes and carrying three purses, illustrating the saint's charity. The supposed relics of St. Nicholas were conveyed from the East to Bari, in the Kingdom of Naples, May 9, 1087, and in the Russian church the anniversary of this translation is still observed as a festival. He is the patron saint of the Russian church as well as of many cities in Europe. The legends about him are in Migne, *Patrologia Græca*, cxvi ff. Consult Eugen Schnell, *St. Nickolaus* (Revensburg, 1886); Jules Laroche, *Vie de saint Nicolas, éveque de Myre, patron de la jeunesse* (new ed., Paris, 1893); Gaeta, *S. Nicolo* (Naples, 1904).

NICHOLAS, Wilson Cary (c.1757–1820). An American legislator, the son of Judge Robert Carter Nicholas. He was born at Hanover, Va., graduated at William and Mary College in 1774, and at the outbreak of the Revolutionary War enlisted in the Continental army, serving for the greater part of the war as officer in command of Washington's Life Guards. In 1788 he was a member of the Virginia convention that ratified the Federal Constitution and was himself a supporter of that instrument. In 1799 he became a Democratic member of the United States Senate, but resigned in December, 1804, to become collector of customs for Norfolk and Portsmouth. From 1807 to 1811 he was a member of Congress and from 1814 to 1817 was Governor of Virginia.

NICHOLAS II LAND. An Arctic archipelago, situated to the north of Cape Chelyuskin, Asia. The most southerly of the islands is within 30 miles of Asia, while the east coasts of Nicholas II Land extend about 200 miles to the north-northwest, to at least 81° N., 96° E. From the exploring ships there was seen an apparently volcanic land, with isolated peaks and high, abrupt cliffs, covered by scanty vegetation. Geological specimens obtained indicate that the archipelago is a northerly extension of the continent of Asia. The new land was discovered in 1913 by Captain Vilkitski (q.v.), who commanded two Russian ice breakers engaged in surveying the Siberian ocean bordering the continent.

NICHOLAS NICKLEBY, nĭk′’l-bĭ. A novel by Charles Dickens. It appeared as a serial in 1838 and 1839. The hero began his career as a teacher in Squeers's school, Dotheboys Hall, Yorkshire, of which Dickens gives a terrible picture, showing the evils of cheap schools of that time.

NICHOLAS OF CLÉMANGES, klā′mäNzh′. See Clémanges.

NICHOLAS OF CUSA. See Cusa.

NICHOLAS OF FLÜE. See Flüe.

NICHOLAS OF LY′RA (c.1270–1340). A biblical scholar. He was born at Lyra (Lyre) in Normandy; entered the Franciscan College at Verneuil in 1291 and afterward studied in Paris; became a doctor of theology and a professor at the Sorbonne; held some of the most important posts of his order, among which was that of provincial for Burgundy; and was eminent as a lecturer on biblical interpretation. His works were approved by the Reformers and used by them to support their arguments. In his system of interpretation he gave preference to the literal as being the one on which all the other methods—mystical, allegorical, and spiritual—were based. His chief work, *Postillæ Perpetuæ in Universa Biblia*, has been regarded as marking the beginning of a school of natural exegesis. He also wrote on the coming of the Messiah, in reply to Jewish critics (*Tractatus Fratris Nicholai de Messia Ejusque Adventu Una cum Responsione ad Judæorum Argumenta Quatuordecim contra Veritatem Evangeliorum*, 1309), and a work on the Sacrament (*Tractatus de Idoneo Ministrante et Suscipiente Sancti Altaris Sacramentum*). An edition of his works in five volumes was published at Rome (1471–72) and one in six volumes at Antwerp (1634). Consult: Davidson, *Sacred Hermeneutics* (London, 1843); H. Graetz, *Geschichte der Juden* (11 vols., Leipzig, 1853–70); for different editions, Theodor Graesse, *Trésor des livres rares et précieux* (Dresden, 1859–69).

NICHOLASVILLE, nĭk′ō-las-vĭl′. A city and the county seat of Jessamine Co., Ky., 90 miles east-southeast of Louisville, on the Louisville and Nashville and the Cincinnati, New Orleans, and Texas Pacific railroads (Map: Kentucky, F 4). It contains a boys' college and a public library and is an important tobacco market and the centre of extensive horse-breeding interests. The chief industrial plants are a saw mill and flouring mills, grain elevators, hemp factory, barite plant, and wheel works. Nicholasville was settled in 1799 and was first incorporated in 1835. The city owns the electric-light plant. Pop., 1900, 2393; 1910, 2935.

NICHOLLS, nĭk′olz, Francis Tillon (1834–1912). An American public official, jurist, and soldier, born at Donaldsonville, La. He graduated at West Point in 1855 and took part in the Seminole War, but resigned from the army in 1856 and returned to his native State, where he began the study of law, being admitted to the bar in 1858. At the outbreak of the Civil War he entered the Confederate service as a captain and rose to the rank of brigadier general. After the close of the war he resumed his practice and in politics became a leader of the Conservative (Democratic) party. In 1876 he claimed the governorship of Louisiana against S. B. Packard, although the Republican returning board had declared the latter elected. The Federal government finally recognized Nicholls, and he administered the government. After serving as president of the board of visitors at West Point he was again elected Governor in 1888. During his second administration occurred the suppression of the Louisiana Lottery. From 1893 to 1904 he was Chief Justice of the State Supreme Court and thereafter until his death associate justice.

NICHOLLS, Rhoda Holmes (1858–). An American water-color painter, born in Coventry, England. She was a pupil of the Bloomsbury School of Art in London and won the Queen's scholarship, later studying in Rome under Cammerano and Vertunni. In 1884, after marrying in Sussex Burr H. Nicholls, she removed to the United States and eventually settled in New York City. Besides identifying herself prominently with the New York Water Color Club, Mrs. Nicholls became a member of the American Society of Miniature Painters and of the American Water Color Society and served as coeditor of *Palette and Brush*. Her work is strong, brilliant, and individual. Among the best examples are her Venetian water colors and her illustrations for Howells's *Venetian Life*. Four of her paintings are in the Boston Art Club and two in the Boston Museum. She received a gold medal at the Competitive Prize Fund Exhibit, New York, and various other awards.

NICHOLS, Edward Leamington (1854–). An American physicist. He was born of American parentage at Leamington, England, and received his education at Cornell University, graduating in 1875. After studying at Leipzig, Berlin, and Göttingen (Ph.D., 1879) he was appointed fellow in physics at Johns Hopkins. He then spent some time in the Edison laboratory at Menlo Park, N. J., and subsequently became professor of physics and chemistry in the Central University of Kentucky (1881), professor of physics and astronomy at the University of Kansas (1883), and professor of physics at Cornell (1887). He was elected a member of the National Academy of Sciences, was president of the American Association for the Advancement of Science (1907) and of the American Physical Society (1907–08), and served as a member of the visiting committee of the United States Bureau of Standards. The degrees of LL.D. and Sc.D. were conferred on Professor Nichols by the University of Pennsylvania and Dartmouth College respectively. In the *Physical Review*, of which he was editor in chief after 1893, and in other journals he published many important papers dealing with radiation, color, physiological optics, photometry, and electricity. He was also the author of several college textbooks on physics.

NICHOLS, Ernest Fox (1869–). An American physicist, born at Leavenworth, Kans. He graduated at the Kansas Agricultural College in 1888 and pursued graduate studies at Cornell, Berlin, and Cambridge universities. He was professor of physics at Colgate University (1892–98), at Dartmouth College (1898–1903), and at Columbia University from 1903 to 1909, when he became president of Dartmouth. He was a research associate of the Carnegie Institution of Washington in 1907–09, engaged in the study of radiation phenomena at the Mount Wilson Solar Observatory. His work includes the remodeling and improvement of the Crookes radiometer; with H. Rubens the study and measurement of long heat waves; the measurement of the heat radiation from the stars Arcturus and Vega and the planets Jupiter and Saturn; and with G. F. Hull the measurement of pressure due to radiation. He was awarded the Rumford medal by the American Academy of Arts and Sciences in 1905 and was elected member of the National Academy of Sciences and vice president of the American Society for the Advancement of Science (1903). Of the *Physical Review* he became associate editor.

NICHOLS, (Henry) Hobart, Jr. (1869–). An American landscape painter. He was born in Washington, D. C., and studied there at the Art Students' League and in Paris at the Académie Julian and under Castellucho. He was the founder of the Society of Washington Artists, was assistant to the director of fine arts of the United States commission to the Paris Exposition in 1900, and in 1912 was elected an associate of the National Academy of Design. Nichols exhibited regularly at the annual exhibitions of the Corcoran Art Gallery, Washington, and received several prizes there.

NICHOLS, John (1745–1826). The last of the learned printers and himself an author, born near London, Feb. 2, 1745. He was apprenticed to William Bowyer and was taken into partnership (1766). On the death of his patron (1777) he succeeded to the business. He died Nov. 26, 1826. For nearly 50 years Nichols devoted himself to writing, editing, and publishing valuable books. From 1778 to 1826 he was wholly or partly responsible for the management of the *Gentleman's Magazine*. Many notable books came from his press and a number from his own pen as well. He published *Royal Wills* (1780); his *Biblioteca Topographica* (10 vols., 1780–1800); an edition (with Steevens) of Hogarth's *Genuine Works* (c.1808); *Atterbury's Correspondence* (1783–99); *Steele's Correspondence* (1788–91); *The Progress of Queen Elizabeth* (1788–1821); *Shakespeare's Plays* (1790); his most important book, *The Antiquities of Leicester* (8 vols., 1795–1815); his edition of Swift (19 vols., 1801).

NICHOLS, William Henry (1852–). An American manufacturing chemist, born in Brooklyn. He studied at the Polytechnic Institute of his native city, graduated from New York University in 1870, and thereafter was a manufacturing chemist and copper refiner and smelter. He became president of the Nichols Copper Company in 1890, was president from 1899 to 1907 and thereafter chairman of the board of directors of the General Chemistry Company, and was prominently connected with other corporations. In 1904 he received degrees of LL.D. from Lafayette College and Sc.D. from Columbia University. In 1904–05 he was president of the Society of Chemical Industry, and in 1912 he presided over the International Congress of Applied Chemistry.

NICHOLSON, nĭk'ol-son, Edward Williams Byron (1849–1912). An English librarian and author, born at St. Helier, Jersey, and educated at Oxford. He was librarian and superintendent at the London Institution from 1873 until 1882, when he became librarian at the Bodleian Library in Oxford. His publications include Gospel commentaries; *The Christ-Child and Other Poems* (1877); *The Rights of an Animal* (1879); *The Bodleian Library* (1882–87); *The Pedigree of Jack* (1892); *Golspie; The Man with Two Souls, and Other Stories* (1898); *Keltic Researches* (1904); *Can we not Save Architecture in Oxford?* (1910).

NICHOLSON, Sir Francis (1660–1728). A British Colonial governor and soldier in America. He was born in England and in 1678 entered the army as an ensign. In 1684 he became a lieutenant and was sent to America, where in 1687 he was appointed deputy for New York of Sir Edmund Andros. Nicholson's administration of affairs in New York was weak and vacillating. In the spring of 1689, at the time of the Leisler Rebellion (see Leisler, Jacob), he was turned out of office and returned to England, a new commission for him from William III as Governor of the Colony arriving soon after his departure. From 1690 to 1694, as Lieutenant Governor of Virginia, he administered the affairs of the Colony with great ability. Although himself a dissolute man, he endeavored, with considerable success, to improve the moral and intellectual condition of the people. He gave his attention to bettering the character and condition of the clergy, established for the first time a regular system of schools, and founded William and Mary College, to which he himself donated the sum of £300. In 1694 Lord Howard of Effingham, under whom Nicholson served as deputy, died, and when Andros was appointed to succeed him Nicholson, disappointed, resigned. He was pacified with the appointment to the governorship of Maryland, where his failure to get along with the colonists was as conspicuous as his success in Virginia had been. In 1698 he returned to Virginia as Governor, but his second term was far less successful than the first. He caused considerable irritation and ill-feeling by his removal of the capital from Jamestown to Williamsburg. He was recalled in 1705. In 1709 and 1711 he made ineffectual attempts to invade Canada by leading an army northward from Albany by way of Lake Champlain. In 1710 he planned and commanded the expedition which resulted in the capture of Port Royal and in 1713 became Governor of Acadia. In 1719, the proprietary charter of South Carolina having been declared forfeited, Nicholson was appointed Royal Governor. He was knighted in the following year and remained in South Carolina until 1725. In the same year he attained the rank of lieutenant general. He published an interesting account of the capture of Port Royal, entitled *Journal of an Expedition for the Reduction of Port Royal* (1711), reprinted by the Nova Scotia Historical Society in 1879, and *An Apology or Vindication of Sir Francis Nicholson, Governor of South Carolina* (1724).

NICHOLSON, HENRY ALLEYNE (1844–99). An English paleontologist, born at Penrith, Cumberland, and educated at Göttingen (Ph.D., 1866) and Edinburgh (D.Sc., 1867; M.D., 1869). He was professor at the University of Toronto (1871–74), at the Durham College of Physical Science (1874–75), at St. Andrews (1875–82), and regius professor of natural history at Aberdeen. Nicholson received the Lyell medal of the Geological Society in 1888, and in 1897 became a fellow of the Royal Society. He was the father of Reynold Alleyne Nicholson. His publications include: *A Manual of Zoölogy* (2 vols., 1870; 7th ed., 1 vol., 1887); *A Manual of Paleontology* (1872; 3d ed., 2 vols., 1887); *Introduction to the Study of Biology* (1872); *Text-Book of Geology* (1872); *The Ancient Life-History of the Earth* (1878); *Synopsis of the Classification of the Animal Kingdom* (1882).

NICHOLSON, HENRY HUDSON (1850–). An American mining engineer, born at Rushford, Wis. He studied at Antioch College, Ohio (1867–70), at Harvard University (1884), and at Heidelberg and Berlin (1885). He was professor of science at the State Normal School at Peru, Neb., in 1874–82 and professor of chemistry and director of the chemical laboratories at the University of Nebraska from 1882 to 1905. Thenceforth he served as consulting engineer of mining companies in Oregon and Cuba and as directing engineer of the Killen-Warner-Stewart Company, Chicago. He was a member of the United States Assay Commission in 1899.

NICHOLSON, JAMES (1737–1804). An American naval officer, born at Chestertown, Md. He was present at the capture of Havana in 1762, lived in New York from 1763 to 1771, then returned to Maryland, and in 1775 became captain of the American ship *Defense.* In March, 1776, he captured several British prizes; in June he was put in command of a 28-gun ship, the *Virginia;* and in October he was made ranking captain of the American navy, the list including at that time only 24 names, among which were Biddle, Barry, and John Paul Jones. His vessel was confined for some time to Chesapeake Bay by a strict blockade, and during this period he and his crew took part as volunteers in the battle of Trenton. In January, 1777, he succeeded Com. Esek Hopkins as commander in chief of the American navy, in which position he remained until the close of the war. Early in 1778, while he was attempting to leave Chesapeake Bay, his vessel ran aground and was captured, but he, with most of his crew, managed to escape. On June 2, 1780, in command of the *Trumbull,* of 38 guns, he fought a drawn battle with the British ship *Wyatt,* and in 1781, off the Delaware capes, after a stubborn resistance, he was captured by the *Iris* and *General Monk.* He was released at the close of the war and returned to New York City, where he was appointed commissioner of loans.

NICHOLSON, JAMES WILLIAM AUGUSTUS (1821–87). An American naval officer. He was born in Dedham, Mass., entered the United States navy as a midshipman in 1838, became a lieutenant in 1852, and in 1853–55 served on the *Vandalia* in Com. M. C. Perry's Japan expedition. During the Civil War he commanded the steamer *Isaac Smith,* of the South Atlantic blockading squadron, in the battle of Hilton Head at Port Royal (Nov. 7, 1861); was promoted to the rank of commander in 1862; was in the action with the Confederate flotilla on the Savannah River in the same year; commanded the monitor *Manhattan,* under Admiral Farragut, in the battle of Mobile Bay; and soon afterward participated in the bombardment of Fort Morgan. In 1865–66 he commanded the steamer *Mohigan* in the Pacific squadron; in 1873 was promoted to be commander; and from 1876 to 1880 was commandant of the Brooklyn Navy Yard. He became a rear admiral in 1881; was placed in command of the European station in the same year; was present at the bombardment of Alexandria, Egypt, by an English fleet in 1882; and by his prompt and energetic measures did much to restore order thereafter. In 1883, having reached the age of 62, he was retired from service with the rank of rear admiral.

NICHOLSON, JOHN (?1821–57). A British general and administrator in India. He was born in the north of Ireland, Dec. 11, 1821 or 1822, and educated at Dungannon College. In 1839 he received a cadetship in the Bengal infantry. In 1841 he fought heroically to defend Ghazni against the Afghans, but was taken prisoner and cruelly treated. His escape was followed by a period of inactivity, during which he was stationed at Meerut, doing duty as adjutant of his regiment. On the breaking out of the Sikh War in 1845 he served in the campaign on the Sutlej and was present at the battle of Firozshah, though he had no opportunity to distinguish himself. After the war, through the recommendation of Colonel Lawrence, Nicholson, now a lieutenant, was appointed assistant to the Resident at the conquered capital, Lahore, and thus fairly transferred to the political branch of the service, in which most of his future life was passed. But with the outbreak of the Sikh rebellion in 1848 came an interlude of military activity, in which he greatly distinguished himself. At the battles of Chillianwalla and Gujrat he earned the approval of Lord Gough, to whom he was immediately attached.

When the Punjab finally became a British province, Captain Nicholson was appointed deputy commissioner under the Lahore Board, of which Sir Henry Lawrence was president. During a furlough (1850–51) he studied military affairs in the great European capitals. For five years after his return to India he was engaged in administrative duties among the savage tribes of the Punjab. His success in bringing them under thorough subjection to law and order was very great, and such was the impression of fear and reverence wrought by the force and personality of the man that he became among these rude populations, under the title of Nikkul Seyn, the object of a curious kind of hero worship. In the great mutiny of 1857 he did noble service for England in helping save the Punjab. When everything was safe behind him, he marched to reënforce the army of General Wilson, engaged in the siege of Delhi. His presence and counsels gave new life to the operations, and in every way he strove to expedite the delayed assault. When the attack on the city was at last ordered, General Nicholson, as he was now, led the first column. As the troops forced their way into the city Nicholson exposed himself fearlessly to animate his men. Conspicuous by his great stature, he became the mark of the enemy's bullets and fell, shot in the back. After great suffering for nine days he died Sept. 23, 1857. Consult: Sir John Kaye, *Lives of Indian Officers* (London, 1867); id., *History of the Sepoy War in India* (ib., 1867); G. B. Malleson, *History of the Indian Mutiny* (ib., 1897); L. J. Trotter, *Life of John Nicholson, Soldier and Administrator, Based on Private and Hitherto Unpublished Documents* (ib., 1897).

NICHOLSON, Joseph Shield (1850–). An English economist, born at Wrawby, Lincolnshire. He studied at Edinburgh, Cambridge, and Heidelberg. He was private tutor at Cambridge (1876–80) and became professor of political economy at Edinburgh in 1880. His writings represent a compromise between the methods of the historical school of German economics and those of the English deductive school. In his principal work, *Principles of Political Economy* (3 vols., 1893–1901), he closely follows the great work of John Stuart Mill in his selection of material, but employs statistical and historical discussion instead of the abstract reasoning from simple assumption which characterizes Mill's works. Among his other important writings are: *Effects of Machinery on Wages* (1878); *Tenant's Gain not Landlord's Loss* (1883); *The Silver Question* (1886); *Money and Monetary Problems* (1888); *Historical Progress and Ideal Socialism* (1894); *Strikes and Social Problems* (1896); *Elements of Political Economy* (1903); *History of the English Corn Laws* (1904); *Rates and Taxes* (1905); *Rents, Wages, and Profits in Agriculture and Rural Depopulation* (1906); *A Project of Empire* (1909); *Tales from Ariosto* (1913); *Life and Genius of Ariosto* (1914).

NICHOLSON, Meredith (1866–). An American writer, principally of novels. He was born at Crawfordsville, Ind., and was educated in the public schools of Indianapolis. A volume of his poems, *Short Flights* (1891), was followed by *The Hoosiers* (1900), an account of Indiana authors, which appeared in the *National Studies in American Letters Series,* and this in turn by: *The Main Chance* (1903); *Zelda Dameron* (1904); *The House of a Thousand Candles* (1905), especially popular; *Poems* (1906); *The Port of Missing Men* (1907); *Rosalind at Red Gate* (1907); *The Little Brown Jug at Kildare* (1908); *The Lords of High Decision* (1909); *The Siege of the Seven Suitors* (1910); *A Hoosier Chronicle* (1912); *Provincial America* (1913), essays; *Otherwise Phyllis* (1913); *The Poet* (1914), a story having as its central character, though unnamed, James Whitcomb Riley. Mr. Meredith became a member of the National Institute of Arts and Letters. Wabash and Butler colleges honored him with the degree of A.M. (1901, 1902) and the former college with the degree of Litt.D. (1907).

NICHOLSON, Reynold Alleyne (1868–). A British Orientalist, son of Henry Alleyne Nicholson. He was educated at the University of Aberdeen and at Trinity College, Cambridge, of which he became a fellow in 1893. He studied at Strassburg and Leyden also. At Cambridge he was lecturer in Persian, and in 1901 he was professor of Persian at University College, London. Among his important publications are: *Selected Poems from the Divani Shamsi Tabiz* (1898); *Fadhkirat-ul-Awliya* (1905–07); *A Literary History of the Arabs* (1907); Arabic reading books (1907, 1909, 1911); *Introduction and Notes to Fitzgerald's Omar Khayyam* (1909); *The Kashf-al-Mahjub* (1911); *The Mystics of Islam* (1914).

NICHOLSON, Thomas (1862–). An American Methodist Episcopal clergyman and educator, born at Woodburn, Ontario. He graduated from the Toronto Normal School in 1883, from Northwestern University and Garrett Biblical Institute in 1892, and studied at the University of Chicago. He had entered the ministry in 1884. From 1894 to 1903 he was professor of philosophy and biblical literature and also principal of the Academy at Cornell College (Iowa) and from 1903 to 1908 professor of philosophy in and president of Dakota Wesleyan University. The General Conference of 1908 elected him secretary of the board of education of the church. Nicholson took a prominent part in the educational development of Iowa and South Dakota. In 1914 he declined the presidency of Cornell College (Iowa). He is the author of *Epworth League Bible Studies* (1901–02); *Epworth League Devotional Topic Book* (1902); *The Necessity of the Christian College* (1904); *Studies in Christian Experience* (1907). After 1908 he edited the *Christian Student.*

NICHOLSON, William (1753–1815). An English scientist and inventor, born in London. After leaving school, he sailed under the East India Company from 1769 to 1776 and was for a time selling agent for the Wedgwood pottery. His *Introduction to Natural Philosophy* (1781) was a prompt success. In 1784 he was appointed secretary to the General Chamber of Manufacturers of Great Britain, and he was also connected, after 1791, with the Society for the Encouragement of Naval Architecture. The earliest journal of its class, the *Journal of Natural Philosophy, Chemistry, and the Arts* (better known as *Nicholson's Journal*), was founded by him in 1797. Water-works engineering was the chief occupation of his later life. He devised an aërometer, a cylindrical linen-printing machine, and a way to bring about the decomposition of water by the voltaic current. His *Dictionary of Practical and Theoretical Chemistry* appeared in 1808 and his *British Encyclopedia, or Dictionary of the Arts and Sciences* (6 vols.) in 1809.

NICHOLSON, William (1872-). An English figure, portrait, still-life, and landscape painter; also a wood engraver. He was born at Newark-on-Trent. Nicholson studied with Herkomer and under Bouguereau and Constant in Paris, but these masters had little influence upon him. After his return to London he and his brother-in-law, James Pryde, began to design posters under the name of the Beggarstaff Brothers. The technical skill shown in these works, their originality and boldness, attracted considerable attention. They are done in black and white with usually a dash of color. In 1896 appeared *The Square Book of Animals*, the first of a now famous series of woodcuts which include: *An Alphabet* (1898); *An Almanac of Twelve Sports* (1898), with Rudyard Kipling; *London Types* (1898), with W. E. Henley; *Characters of Romance* (1900). Most successful of all, however, were his *Twelve Portraits*, of which the best cuts are Queen Victoria, Whistler, Bernhardt, Kipling, and Earl Roberts. In simplification of drawing and unerring selection of essentials he closely approaches the great Japanese masters, though his technique is thoroughly Western. Of recent years he has chiefly confined himself to painting, displaying in his portraits, figure subjects, still-life, and open-air studies marked individuality, large simplicity of design, subtle draftsmanship, and a realistic treatment combined with a strong sense of style. He is perhaps at his best in his portraits of children, such as Masters Francis and Christopher Bacon, "The Little Baron," and "Nancy." Other portraits include Miss Marie Tempest, James Pryde, and the Earl of Plymouth and his family. "Carlina" (1909) presents a remarkable study of the nude, and "The First Communion Day" and "Place du Petit Enfer" are fine studies of old towns. Nicholson received a gold medal at the Paris Exposition in 1900.

NICIAS, nĭsh'ĭ-as (Lat., from Gk. Νικίας, *Nikias*). A famous Athenian statesman and general during the Peloponnesian War. He was the son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver mines at Laurium. Nicias belonged to the aristocratic party and after the death of Pericles presented himself as the opponent of Cleon, the great popular or demagogic leader. The opposite in character to Alcibiades, he was wary, cautious, obstinate, and irresolute. He was generally successful in his enterprises against the Spartans and their allies. In 427 B.C. he captured the island of Minoa, in the following year he ravaged the island of Melos and the coasts of Locris, and in 424 B.C. he captured the island of Cythera and ravaged the coast of Laconia. After the death of Cleon he brought about a peace between the Spartans and the Athenians (421 B.C.) called the Peace of Nicias; this closed the first period of the Peloponnesian War. Six years afterward the Athenians, at the instigation of Alcibiades, resolved on a great naval expedition against Sicily. Nicias was appointed one of the commanders, although he had strongly protested against the undertaking. In the autumn of 415 B.C. he laid siege to Syracuse and was at first successful, but subsequently, after the death of Lamachus, proved unequal to his task and experienced a series of disasters; his fleet was destroyed, and his troops began a retreat towards the interior of Sicily. They were speedily forced to surrender, and Nicias was put to death (413 B.C.). Consult the *Histories of Greece* by Grote, Curtius, Holm, Beloch, and Eduard Meyer; also Plutarch's "Life of Nicias," translated by B. Perrin (New York, 1912).

NICIP'PE BUTTERFLY. See Colored Plate of Butterflies, American.

NICK'EL (Swed. *nickel*, connected perhaps with Ger. *Nickel*, devil, cf. the etymology of *cobalt;* according to others connected with Icel. *hnikill*, ball, lump). A metallic element discovered by Cronstedt in 1751. It was first mentioned in 1694 by Hiarni, who called it koppar-nickel, signifying false copper, because, while its ores resembled those of copper, that metal could not be extracted from them. Cronstedt successfully isolated the metal, but it was not until Bergman in 1774 corroborated his investigations that its distinct nature was recognized. Nickel is a constituent of all meteoric irons, and it has been detected spectroscopically in the atmosphere of the sun. On the earth it occurs, usually associated with cobalt, in pentlandite, niccolite, gersdorffite, millerite, garnierite, and certain other minerals. The wide distribution of the sulpharsenide ores led to their extensive working in Saxony, Norway, Sweden, Austria, Spain, Russia, Great Britain, and the United States, but since the discovery of garnierite in New Caledonia in 1873 and the development of the nickeliferous pyrrhotite in Sudbury, Ontario, Canada, subsequent to 1887 these two localities have become the principal sources of nickel ores. An important discovery of a deposit of niccolite, smaltite, and metallic silver of extremely high value was made at Cobalt, 150 miles north of Sudbury, during 1904. The world's production of nickel in 1912 was approximately 26,500 metric tons. More than three-quarters of this originated in the mines of the Sudbury district, Canada, while most of the remainder came from the ores of New Caledonia.

Nickel (symbol, Ni; atomic weight, 58.7) is a silver-white lustrous metal that is magnetic at ordinary temperatures, is ductile, hard, and tenacious, has a specific gravity of 8.90 in the solid state and a melting point of about 1450° C. It is one of the very hardest of the metals, and it is capable of taking a fine polish. By adding a small quantity of magnesium to fused nickel the latter can be rolled into thin sheets and welded on sheet iron or steel. Nickel thus treated may be drawn into wire. The chief use of nickel is in the manufacture of alloys, chiefly German silver (copper-zinc-nickel) and nickel steel. The latter type of alloy finds application in the manufacture of armor plate and structural steel of superior quality. Nickel is also used, both pure and alloyed with copper, for coinage. An alloy of nickel and copper containing about 70 per cent of the former metal and small quantities of the ordinary metallic impurities is manufactured directly from the Canadian ore under the name of Monel metal. This alloy possesses great strength and permanency in the air and may be obtained from the manufacturers in a variety of shapes. Nickel combines with oxygen to form two oxides. The monoxide, NiO, is a grayish-green substance found native as bunsenite. It may be made by strongly heating the hydroxide, carbonate, or nitrate. The sesquioxide of nickel, Ni_2O_3, is a black substance obtained by heating the nitrate or carbonate in the air. The most important commercial salt of nickel is ammonium-nickel sulphate. The crystals, of a bright-green color, find their chief use in nickel plating. The carbonate may also be used for electroplating. Nickel salts, when hydrated or in solution, have a fine emerald-green color.

Metallurgy. When nickeliferous ores of lead, cobalt, copper, or silver containing arsenic are smelted, the nickel combines with the arsenic to form speiss; should arsenic not be present, the nickel enters the various intermediate products of the smelting process, such as matte, blister copper, tough pitch copper, or other reduced metals. Formerly small amounts of nickel were obtained from speiss or other metallurgical byproducts, either in the wet way, by chemical solution and precipitation, or in the dry way, by heating purified oxidized nickel compounds with carbon in a crucible or reverberatory furnace. In recent years two processes have been developed for the production of metallic nickel on a large scale: (1) the matte smelting process, which is carried out in furnaces at a comparatively high temperature; and (2) the Mond gas process, at a comparatively low temperature, using a modified gas-making plant. This process is now used mainly in treating matte, the common product of smelting, for its nickel content whereby a final product containing up to 99.8 per cent nickel is obtained. The smelting process used for the Sudbury ores is essentially as follows: The ore containing about 2 per cent of nickel and 3 per cent of copper is roasted in heaps until its sulphur content has become reduced to about 7 per cent. The roasted ore, together with suitable flux and coke, is smelted in a water-jacketed blast furnace to yield a matte containing variable proportions of copper, nickel, iron, and sulphur and a slag which is separated by gravity and rejected. The matte is then treated in a basic converter of the large horizontal type used in copper metallurgy (q.v.), which oxidizes and removes a large portion of the sulphur and most of the iron, the product containing 75 to 80 per cent of nickel and copper in the proportion of about 2:1. For making the copper-nickel alloys the Bessemerized matte is roasted to remove its remaining sulphur and reduced directly by carbon at elevated temperature to an alloy containing about equal parts of copper and nickel—material which, on account of its low melting point, is eminently suited for manufacture into German silver. For making the pure metal or oxide the Orford or top and bottom process is used, in which the Bessemerized matte is roasted in reverberatory furnaces or submitted to an additional treatment in the Bessemer converter until the metals are present in the form of subsulphides; this material is then melted in a blast furnace with salt cake (sodium sulphate), and the bulk of the iron and copper is converted into sulphides that mix with the sodium sulphide reduced from the sulphate and form a very fluid mass (top), floating above the heavier molten nickel sulphide (bottom); these products are tapped into conical molds and separated after cooling. Repeating this operation finally yields pure nickel sulphide, which is calcined to form nickel oxide and subsequently reduced to metallic nickel by heating with carbon in a crucible or reverberatory furnace. Detailed information relative to newer developments of the Orford process and the precise methods of operating are not permitted to become public. In the Mond gas process, used in Wales, the oxidized nickeliferous material is treated with water gas at a moderately low temperature. The carbon monoxide of the water gas unites with the nickel to form nickel carbonyl, which is volatilized and subsequently reduced to metallic nickel in a special apparatus. Wet methods of extracting nickel from its ores and furnace products resemble other chemical processes. The various metals are dissolved in acids and precipitated separately from the acid solution. The nickel compounds are either transformed into commercial salts, such as nickel-ammonium sulphate, or are reduced to metallic nickel by smelting with carbon in a crucible or reverberatory furnace. Consult: Carl Schnabel, *Handbook of Metallurgy*, vol. ii (New York, 1907); *The Mineral Industry* (ib., annually); and especially A. P. Coleman, *The Nickel Industry* (Ottawa, 1913).

NICKEL STEEL. See IRON AND STEEL, METALLURGY OF; METALLOGRAPHY.

NICKNAMES, NATIONAL. See NATIONAL NICKNAMES.

NICOBAR (nĭk'ō-bär') **ISLANDS.** A group of islands in the Indian Ocean beginning 130 miles northwest of Sumatra and stretching northwestward for nearly 200 miles (Map: French Indo-China, B 5). They form with the Andaman Islands to the north of them the northern extension of the great chain of islands of which Sumatra and Java are the principal members. The group consists of 19 islands, of which 12 are inhabited, the largest being Great Nicobar and Little Nicobar in the south, Katchall and Camorta in the centre, and Car Nicobar in the north. The area of Great Nicobar, the largest, is 333 and of the whole group 635 square miles. The southern islands are mountainous and covered with dense forests; those in the north are low, less fertile, but supporting large numbers of coco palms. The climate is hot, humid, and very unhealthful for Europeans. The Nicobarese are classed with the Selungs of the Mergui Archipelago as Indonesians. The inhabitants of the smaller islands and of the coast of Great Nicobar have intermixed with Malays. In all probability they belong originally to one of the primitive stocks of Farther India (proto-Malay?) with Negrito and Malay admixtures. The northern Nicobarese are monogamous and value chastity very highly. Their mental capacity is very considerable, much larger than has been generally supposed. Nicobarese is a highly developed analytical language, of the Mon-Khmer family, differentiated into six mutually unintelligible dialects. Natives born to different dialects converse in a mutually known foreign tongue, e.g., Hindustani, Malay, Burmese, or English. An undisguised animism constitutes the religion of the people, who are given to gross and most unusual superstitions. The indigenous population was 5942 in 1883 and 5962 in 1901, when the total population was 6511; total population in 1911, 8818. The Nicobarese are largely supported by trade in copra and coconuts, of which the islands produce immense numbers. Formerly they were engaged in piracy and wrecking, but have been peaceful since the British occupation. The islands form, together with the Andamans, the British Indian Province of the Andaman and Nicobar Islands, governed by a British chief commissioner. A British government agent resides at Nancowry Harbour, where there is a fine landlocked harbor between Camorta, Nancowry (Nankauri), and Trinkat islands. The Nicobar Islands were settled by Denmark in 1756, but her attempts at colonization were unsuccessful, and she abandoned them in 1848. Meanwhile there were various unsuccessful missionary attempts at settlement. In 1869 the islands were annexed by the British. They established a penal settlement at Nancowry Harbour, but discontinued it in 1888.

NICOBAR PIGEON. A large and very beautiful ground-feeding pigeon of the East Indies (*Calœnas nicobarica*), which is remarkable for the elongated feathers that mantle the neck and for its very wide distribution over the Polynesian region. Consult A. R. Wallace, *Malay Archipelago* (London, 1906).

NICODÉ, nē'kô-dā', JEAN LOUIS (1853–). A German pianist and composer, born at Jerczik, near Posen. He studied music under his father and the organist Hartkäs, entered Kullak's Neue Akademie der Tonkunst at Berlin in 1869, and became a music teacher in that city. In 1878 he made a successful concert tour with Madame Artôt in Galicia and Rumania, was professor at the Dresden Conservatory in 1878–85, conducted the Philharmonic Concerts in 1885–88, and became director of the Dresden Neustadt Chorgesangverein in 1893. His works include: *Marie Stuart* (1881), a symphonic poem for orchestra; *Sonata for Violoncello in G Major* (1882); *Symphonic Variations* (1883), for orchestra; *Pictures from India* (1886); *Das Meer* (1889), a symphonic ode; *Suite for Small Orchestra* (1892); *Gloria* (1904).

NICODE'MUS (Gk. Νικόδημος, *Nikodēmos*, conqueror of the people). A prominent Pharisee of Jerusalem and a lay member of the Sanhedrin, mentioned in three passages of the Fourth Gospel (iii. 1–15, vii. 45–52, xix. 38–42). The reference to him in iii. 10 as "the teacher of Israel" does not imply that he occupied a special teaching position in the Sanhedrin, as there was no such position in that body, but that as a member of the highest court of the nation he was a representative of the teachers of Israel. In the first of the above passages he is spoken of as coming to Jesus at night, which must have been to the place where Jesus was accustomed to pass the time of his retirement after the day's activity. This has generally been understood as the house where Jesus was residing during his stay in the city, though Ramsay claims that it is more likely to have been on the Mount of Olives. (Consult *The Education of Christ*, pp. 73–76.) In the interview narrated in chap. iii he apparently represents the group of people who through the "signs" performed by Jesus during the Feast time had been led to a belief in him as a Teacher whose commission from God was accredited by the wonders he had performed, but not to any personal commitment of themselves to his following. (Cf. ii. 23–25 with iii. 2.) Though his unenlightened position was disclosed to him in this interview, there is no evidence that the disclosure materially altered it. At the same time, in the Sanhedrin discussion given in chap. vii he seems to have come to a more open position regarding Jesus personally, if not respecting his cause. He is there represented as reminding his colleagues who were complaining at the nonarrest of Jesus, whom they held to be a deceiver of the people, that the law, in whose interest they claimed to be acting, did not judge a man until he had first been heard and it had been ascertained by examination what he was doing. In the last passage (chap. xix), however, he appears still to be of the same cautious disposition as at the time of his first interview with Jesus; for though he does not hesitate to coöperate in the hasty arrangements for the burial of Jesus, he does not come with his aid, generous as it was, until the body had been secured from Pilate. In fact, he may have assumed that there would be indifference on the part of the Jews as to any respect shown to Jesus now that he was dead, and so may have been encouraged to such boldness as he showed. As to his later history it is possible that he is to be identified with the Nicodemus of the Talmud commonly called Nicodemus Ben Gorion, a man of large wealth, who was accused of being a disciple of Jesus and who lost all his possessions in the destruction of Jerusalem; but from the apparent age of Nicodemus at the time of his interview with Jesus (iii. 4) the identity is doubtful. In an apocryphal book, *The Gospel of Nicodemus*, or *Acts of Pilate*, the few facts recorded in the Gospels are elaborated and commented on at considerable length, evidently with no basis of historic truth behind them. Consult George Matheson, *Representative Men of the New Testament* (New York, 1905), and John Reid, *Jesus and Nicodemus* (ib., 1907).

NICOL, nĭk'ol, ERSKINE (1825–1904). A Scottish genre painter, born at Leith, near Edinburgh. He studied at the Trustees' Academy, Edinburgh, under Sir William Allen and Duncan and then went to Ireland for four years. In 1859 he was elected a member of the Royal Scottish Academy and in 1863 went to live in London, where he was made associate of the Royal Academy in 1868. His works are genre, generally of Irish subjects, in which the comic side of life is accentuated. They are spiritedly drawn, agreeable in color, and show keen insight into character. Many of them are well known in the United States through engravings. Among the best are "Paddy's Mark," in the Corcoran Gallery, Washington; "Paying the Rent," in the Metropolitan Museum, New York; and "Wayside Prayer" and "The Emigrants," in the Tate Gallery, London.

NIC'OLA, LEWIS (1717–c.1807). An American soldier, born in Dublin, Ireland. He became ensign in the British army in 1740 and afterward major. He resigned and came to Philadelphia about 1766 and was employed in civil engineering. In 1776 he was made barracks master of the city and aided in preparing for defense. In December, 1776, he was made town major with State rank, and he held this position for six years. His suggestions on military organization and defense were highly valued in official quarters. He presented to Congress a plan for an invalid regiment, which should serve both as a home guard and a training school, was made the colonel in June, 1777, and was brevetted brigadier general in 1783. He was an original member of the Pennsylvania branch of the Society of the Cincinnati and wrote to Washington for the army officers the famous letter suggesting that the latter become King of the country. The letter drew a vigorous rebuke from Washington. Nicola published *A Treatise of Military Exercise Calculated for the Use of Americans* (1776).

NICOLAI, nĭk'ô-lī, CHRISTOPH FRIEDRICH (1733–1811). A well-known German littérateur, born in Berlin. From 1752 he directed a publishing and bookselling establishment, which he made one of the largest in Berlin. He became (1754) a member of a literary circle which included Lessing and Moses Mendelssohn, with the latter of whom he established at Berlin in 1757 the *Bibliothek der schönen Wissenschaften* (conducted from vol. v, 1760, by C. F. Weisse at Leipzig), designed as an independent critical journal. He also collaborated with Mendelssohn and Lessing (whose place was later taken by Thomas Abbt) in the *Briefe die neueste Litteratur betreffend* (1761–67), a literary review presented as letters addressed to a supposititious officer, wounded in the Seven Years' War. Another periodical, the *Allgemeine deutsche Bibliothek* (106 vols., 1765–91; with a continuation, in all 162 vols., 1805), he made known chiefly for its harshness and insipidity. A rationalist in philosophy, he wrote *Sebaldus Nothanker* (1773), a satirical novel, but rather a heterodox monograph than the work of fiction it purported to be, and bitterly attacked Kant, Fichte, and the critical school in general. He attempted to cast ridicule upon most of what was significant in the German literature of the time, e.g., the work of Goethe and Schiller, who made spirited reply in the *Xenien*, and the revival of interest in folk poetry, against which he directed his *Feyner kleyner Almanach vol schönerr, echterr, liblicherr Volckslieder* (1777–78; new ed., 1887). Yet in earlier critiques he worked effectively towards the improvement of taste, and his *Anekdoten von Friedrich II.* (1788–92) is of permanent historical value. His *Beschreibung einer Reise durch Deutschland* (1781; 3d ed., 12 vols., 1788–96) is dull reading. Consult his *Autobiographie* (ed. by Löwe, Berlin, 1806); L. F. G. von Göckingk, *Nicolais Leben und litterarischer Nachlass* (ib., 1820); Minor, "Lessings Jugendfreunde," in Joseph Kürschner, *Deutsche Nationallitteratur*, vol. lxxii (Stuttgart, 1883); *Allgemeine deutsche Biographie*, vol. xxiii (Leipzig, 1886). See also GERMAN LITERATURE.

NICOLAI, OTTO (1810–49). A German composer, born at Königsberg in 1810. His early life was a struggle with poverty and difficulties, and although his first lessons in music were given to him by his father, the lack of sympathy between them and the oft-repeated brutality of the elder caused the boy to run away from home (1826) and find a patron in Adler of Stargard, by whose aid he was enabled to complete his studies. He studied for three years in Berlin under Klein and in 1835 went to Rome, where he went through three more years of study under Baini. In 1841 he succeeded Kreutzer (q.v.) as court conductor in Vienna, where he established the famous Philharmonic Concerts. After traveling over Europe he became in 1847 kapellmeister at Berlin, a post which he soon resigned. He appeared as a composer of dramatic music as early as 1831; but his first work of importance was *Il Templario*, founded on Scott's romance of *Ivanhoe*, which, produced at Turin in 1841, attained a high and permanent reputation. In 1848 he wrote at Berlin *Die lustigen Weiber von Windsor*, on which his renown as a musician is founded, a work charming for its clear design and lively, vigorous tone. Two months after the production of this, his chef-d'œuvre, its composer died, in Berlin. Consult G. R. Kruse, *Otto Nicolai, ein Künstlerleben* (Berlin, 1912).

NICOLAIE, nē'kô'lā', or NICOLAISE, nē'kô'lâz', LOUIS FRANÇOIS. See CLAIRVILLE, L. F.

NIC'OLA'ITANS (Gk. Νικολαῖται, *Nikolaitai*). Representatives of a form of false teaching and loose moral practice, mentioned only in Rev. ii. 6, 15 and in early Christian literature bearing on these passages. Among the early references is the following by Irenæus (*Against Heresies*, i, 26): "The Nicolaitans are the followers of that Nicholas who was one of the seven first ordained to the diaconate by the Apostles. They led lives of unrestrained indulgence. The character of these men is very plainly pointed out in the Apocalypse of John, [where they are represented] as teaching that it is a matter of indifference to practice adultery and to eat things sacrificed to idols." They evidently carried to an illogical and immoral extreme the principles of religious freedom from legal requirements taught by St. Paul. Certain critics have seen in these references of the Apocalypse an allegorical portrayal of Paul's teachings by those to whom they were repugnant. Most scholars, however, find no warrant for this. The Nicolaitans were among the obscure early Gnostic heretics who offended chiefly in violating the decree of the Council at Jerusalem (Acts xv. 29), which forbade participation by Christians in the heathen feasts and in the licentiousness by which these celebrations were commonly attended. That they were personal followers of Nicolas or Nicolaus of Antioch (Acts vi. 5) has not been proved, but may be considered barely possible. Their name (in Greek, conqueror of the people) closely resembles the name Balaam (in Hebrew, destroyer of the people), whence it has been argued that no such sect really existed, but the close association of the terms in the Apocalypse is a part of its allegorical method. There is no reasonable warrant for the conjecture. The sect was insignificant and disappeared. Other sects called Nicolaitans are met with in the Middle Ages; one flourished in the fifteenth century in Bohemia; these have no connection with the party mentioned in the Apocalypse. Consult the commentaries on Revelation; A. C. McGiffert, *A History of Christianity in the Apostolic Age* (New York, 1897); Theodor Zahn, *Introduction to the New Testament*, vol. iii (ib., 1909).

NICOLAUS CUSANUS. See CUSA, NIKOLAS OF.

NIC'OLA'US (Lat., from Gk. Νικόλαος, *Nikolaos*) **OF DAMASCUS.** A Greek historian of the first century B.C., an intimate friend of Herod the Great and of Augustus. His numerous works include his autobiography, of which a considerable portion remains; a history of the world down to his own time, in 144 books, of which fragments have been preserved; and a panegyrical biography of Augustus, of which some extracts, made by command of Constantine Porphyrogenitus, are extant. He also wrote commentaries on various philosophical works, and several tragedies and comedies. A fragment of one of the tragedies has been preserved by Stobæus. The fragments may be found in Müller, *Fragmenta Historicorum Græcorum* (5 vols., Paris, 1841–70). Consult also F. Navet, *Nikolaus von Damascus* (1853); Steinmetz, *Herod and Nicolaus* (Lüneburg, 1861); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1911–13); Trieber, *De Nicolai Damasceni Laconicis* (Berlin, 1867).

NICOLAY, nĭk'ō-lā, John George (1832–1901). An American author, born in Essingen, Bavaria, Feb. 22, 1832. He came to the United States in 1838, attended school in Cincinnati, Ohio, and later went to Illinois, where he edited the *Pike County Free Press* at Pittsfield. Then he became assistant to the Secretary of State of Illinois and while in this position met Abraham Lincoln. He served as private secretary to Lincoln during the Civil War (1861–65) and after the death of the President became United States Consul at Paris, France (1865–69). He was marshal of the United States Supreme Court (1872–87). His death occurred at Washington, Sept. 26, 1901. Besides contributions to the leading magazines, Nicolay's writings include *The Outbreak of the Rebellion* (1881) and *Abraham Lincoln: A History* (in collaboration with John Hay). The latter work is the authoritative and definitive life of Lincoln. It appeared in the *Century Magazine* serially from 1886 to 1890 and was then issued (1890–94) in book form (10 vols.), together with the *Complete Works of Abraham Lincoln* (2 vols.). Nicolay and Hay also edited Lincoln's *Works* in 12 vols. (1905). *A Short Life of Lincoln*, based on *Abraham Lincoln: A History*, appeared in 1902, and in 1912 was published *Personal Traits of Abraham Lincoln* by Helen Nicolay (1866–). Miss Nicolay says in her preface to this book that she grew up in an atmosphere of Lincoln and that even as a child she was permitted to aid her father in his great work. The *Personal Traits* is composed of material which Mr. Nicolay had intended to work up himself at some time. The daughter is author also of *The Boys' Life of Abraham Lincoln* (1906) and *The Boys' Life of Ulysses S. Grant* (1909).

NICOLE, nē'kōl', Pierre (1625–95). A French Jansenist writer. He was born at Chartres and at an early age attained unusual proficiency in classical studies, at first under the teaching of his father, a counselor in the Parlement of Paris. From 1642 to 1644 he studied philosophy in Paris, where he took his master's degree, and studied theology at the Sorbonne in 1645–46. He was already under the influence of the Jansenist (see Jansenism) leaders, especially Antoine Arnauld, and after taking his bachelor's degree in theology went to Port Royal in 1649. Five years later he returned to Paris and devoted his talents to promoting the cause of Jansenism. In 1679 his outspoken opposition to the ruling doctrines made it advisable for him to accompany Arnauld to the Low Countries, where he lived at Brussels, Louvain, and elsewhere until he got permission to return to Chartres, and in 1683 to Paris, where he died. He wrote a large number of controversial treatises, all characterized by purity of style and subtlety of discrimination. To him is due the principal part of the celebrated Port Royal logic—*La logique, ou l'art de penser* (Paris, 1662; Eng. trans., ed. T. S. Baynes, 10th ed., London, 1898). His *Essais de morale* (6 vols., 1671 et seq.) is his most important work; it was continued in a new edition with life by C. P. Goujet (14 vols., Paris, 1767–82). It is abridged in *Choix des essais de morale de Nicole*, by S. de Saci (Paris, 1857). Consult Sainte-Beuve, *Port Royal*, vol. iv (Paris, 1882).

NICOLET, nē'kō'lā'. A town and the county seat of Nicolet County, Quebec, Canada, situated at the mouth of the Nicolet River, on Lake St. Peter and on the Intercolonial and the Quebec, Montreal, and Southern railways, 82 miles by rail northeast of Montreal (Map: Quebec, F 4). It is the seat of a Roman Catholic bishop and possesses a Roman Catholic cathedral, college, and seminary, county buildings, commercial academy, hospital, and two monasteries. Its industrial establishments include sash and door factories, brickyards, a tannery, and manufactories of aërated waters, optical appliances, and foundry and machine-shop products. Pop., 1901, 2225; 1911, 2593.

NICOLL, nĭk'ŭl, Robert (1814–37). A Scottish poet, born in Perthshire and chiefly self-educated. An apprenticeship to a grocer and wine merchant did not blight a natural gift for poetry, which found expression eventually in a volume of *Poems* (1835) and in *Poems and Lyrics* (posthumously published, 1844). An enthusiastic radical, he became editor of the Leeds *Times* in 1836. In the next year, overtaxing his health in electioneering work, he died untimely. His folk songs in his native dialect, fresh, strong, and simple, constitute his best work. Consult the Memoir in *Poems and Lyrics*, above mentioned, and the *Life* (1884) by P. R. Drummond.

NICOLL, Sir William Robertson (1851–). A British author and journalist, born at Lumsden, Aberdeenshire, Scotland; known also by his pseudonym "Claudius Clear." He was educated at the University of Aberdeen; was Free church minister at Dufftown (1874–77) and at Kelso (1877–85). In 1884 he became the editor of the *Expositor;* in 1886 of the *British Weekly*, which he founded; in 1891 of the *Bookman*, which he also founded; and in 1900 of the *British Monthly*. In 1909 he was knighted. His publications include: *The Incarnate Saviour* (1881); *The Lamb of God* (1886); *The Key of the Grave* (1893); *Literary Anecdotes of the Nineteenth Century* (1895), edited with T. J. Wise; jointly with C. K. Shorter, a new *Life of the Brontës* (1895); *The Return to the Cross* (1897); *Letters on Life* (1901); *Life of Ian Maclaren* (1908); *The Round of the Clock* (1910); *Emily Brontë* (1910); *Sunday Evening* (1910); *Expository Sermons* (1911); *The Problem of "Edwin Drood": A Study in the Methods of Dickens* (1912); *Bookman's Letters* (1914; 5th ed., 1915). Nicoll edited *The Expositor's Greek Testament* and a complete edition of the works of Charlotte Brontë (1902). He became known as one of the leading writers on the Brontë family.

NICOLLET, nē'kō'lā', Joseph Nicolas (1786–1843). A French astronomer and explorer, born at Cluses in Savoy. When about 21 years old he went to Paris, becoming a naturalized Frenchman in 1819. He had secured a position in connection with the observatory in 1817, and in 1822 was promoted to be assistant astronomer in the Bureau of Longitudes. Nicollet discovered at the same time as Pond the comet of 1821, and in 1822–23 was engaged with Colonel Brousseau in measuring an arc of latitude in the south of France. Obliged to leave the country in 1830 because of unfortunate speculations, he went to the United States, where the government gave him some assistance in making a geographical and geological exploration of the territory beyond the Mississippi. The results of these researches are embodied in a series of memoirs which appeared in the *Connaissance des Temps* and in Silliman's *Journal*. Among his other publications are: *Des assurances sur la vie* (1818); *Cours de mathématiques* (1830); and a *Report and Map of the Hydrographical Basin of the Upper Mississippi River* (1843). Consult Sibley, "Memoir of J. N. Nicollet," in the *Collections of the Minnesota Historical Society*, vol. i (St. Paul, 1872).

NICOLLS, nĭk'olz, MATHIAS (c.1630–87). An English Colonial official, born at Plymouth. He was admitted to the bar and in 1664 was appointed by Charles II secretary of the commission headed by Col. Richard Nicolls (q.v.), which was to regulate New England and capture New Netherland. He became the first Secretary of New York after the English occupation (Sept. 8, 1664), and was appointed a member of the Governor's Council. He drew up, under the supervision of Governor Nicolls, a code from the English, the Roman-Dutch, and the local laws of New England, which was promulgated at Hempstead in October, 1664, and was later known as the Duke's Laws. The provisions of this code were liberal and well adapted to conciliate the mixed population of the young community. In the Court of Assizes provided in this code Nicolls was the presiding justice, and in 1665 he was appointed judge of the Admiralty Court. He was elected mayor of New York in 1672, being the third to fill that office. He also served as captain of the militia and led some expeditions against the Indians. Though deposed as secretary when the Dutch recaptured the province in 1673, he was reappointed by Andros in 1674. In 1680 he resigned all his offices and went to England. Upon his return in 1683 he was appointed one of the two judges of the Supreme Court of the Colony. During that year and the next he was Speaker of the First Assemblies of the Province. He bought and entered much land in Queens County, and died on his estate, Plandome.

NICOLLS, RICHARD (1624–72). A British soldier and Colonial Governor in America. During the Civil War in England he commanded a troop of horse on the Royalist side. He went with the Stuarts into exile and served with the Duke of York under Marshal Turenne. After the Restoration he was groom of the bedchamber for the Duke of York. In 1664 Charles II appointed a commission, consisting of Col. Richard Nicolls, Sir Robert Carr, Sir George Cartwright, and Samuel Maverick, to investigate complaints against and disputes among the New England Colonies and to reduce the Dutch in New Netherland, a territory given by English royal grant to the Duke of York. Nicolls was the real civil and military head of the commission, which was virtually a war measure for the capture of New Amsterdam. His presence was to be necessary for a quorum, and he was commissioned as Deputy Governor of the territory to be captured. After touching at Boston he appeared before New Amsterdam, Aug. 25, 1664, with four warships and 300 soldiers, and on September 8 Governor Stuyvesant was forced to surrender. Governor Nicolls assumed authority over New York and New Jersey. He made no radical changes, was firm, yet conciliatory, and soon won the respect and confidence of the people and the good will of the Indians. In March, 1665, he published the Duke's Laws, which had been drawn up under his supervision (see NICOLLS, MATHIAS) and which served for a time as a constitution. On June 12, 1665, he established the English form of municipal government for the city of New York. The French and Indian troubles of 1666 were settled with credit, and much was done to reconcile the Dutch and English inhabitants, but Nicolls complained that he had spent much money from his private purse to maintain the establishment. He asked several times to be relieved, and in 1667 his petition was granted, but he remained until Governor Lovelace arrived, in August, 1668. When he sailed for England both Dutch and English joined in praising the wisdom and moderation of his administration. His time had been so fully occupied with affairs in New York that he largely left the management of New England to the other commissioners. When the war broke out between the English and the Dutch in 1672, he served in the Duke of York's fleet, and was killed at Solebay.

NIC'OL PRISM. A prism formed from a crystal of calcite devised by William Nicol of Edinburgh, in 1828, to polarize light. The Nicol prism, which has undergone various modifications, is a most convenient source for obtaining plane polarized light, and is largely employed in many forms of polariscopes. It consists essentially of two halves of a crystal cemented by Canada balsam. The accompanying diagrams will show its construction. In Fig. 1 *AGBFDEC* is a rhomb of calcite, a material which is doubly refracting (see LIGHT, *Polarization*), while Fig. 2 shows diagrammatically a section of a Nicol prism in the plane *ABCD*. In the natural crystal the angle *BAD* is 71°, but in the prism this is made 68°, and the halves of the crystal which form the prism are cemented together with Canada balsam along the line *BD*, which makes an angle of 90° with *BA*. The plane of the balsam is perpendicular to the end of the face of the prism. Under these conditions the ray of light falling upon the prism at *H* is broken by double refraction into two rays—the extraordinary, which travels to *J* and passes out of the prism and is available for experimentation, and the ordinary, which strikes the balsam at an angle of incidence so great that it is totally reflected at *I* and absorbed by the blackened side of the prism. The plane of the polarization of the extraordinary ray is perpendicular to the plane of

FIG. 1. RHOMB OF CALCITE.

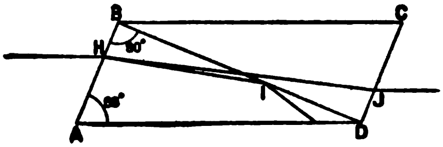


FIG. 2. NICOL PRISM.

the diagram, while that of the ordinary ray is parallel to it. See LIGHT; POLARISCOPE.

NICOMACHUS, nī-kŏm′ȧ-kŭs (Lat., from Gk. Νικόμαχος, *Nikomachos*). A celebrated painter of the fourth century B.C., a son and scholar of Aristides. The references to him praise his mastery in technique and rapid but effective execution. The notices, however, throw but little light upon his style. His works are known only from a particular list in Pliny (*Hist. Nat.*, xxxv, 108; cf. ib., 145).

NICOMACHUS (c.100 A.D.). A Neo-Pythagorean philosopher and mathematician, born at Gerasa, probably in Judæa. He wrote an arithmetic in two books, of which the best edition is that of Hoche (Leipzig, 1866). In this he fully treated of the theory of figurate numbers, and the work is interesting as containing the first known multiplication table of the ordinary type, although we have several elaborate multiplications in the Babylonian cylinders. Commentaries on this work were written by Iamblichus (q.v.), Philoponus, Soterichus, and others, and portions of the book were translated into Latin by Boëthius and Apuleius. Nicomachus also wrote a *Harmonices Manuale* (published in 1625; French trans., 1880), of which the first book is still extant; the so-called second book, consisting of two fragments which probably did not belong to the original, was published in Jans's *Musici Græci* (Leipzig, 1895).

NICOMEDES, CONCHOID OF. See CONCHOID OF NICOMEDES.

NIC′OME′DIA (Lat., from Gk. Νικομήδεια, *Nikomēdeia*). The capital of ancient Bithynia, situated at the northeastern angle of the Gulf of Astacus, in the Propontis, now called Bay of Ismid (Map: Greece, Anc., G 1); founded 264 B.C. by Nicomedes I after the destruction of Astacus (on the opposite side of the bay) by Lysimachus. Nicomedes made it the capital of the Kingdom, and it became one of the magnificent and flourishing cities of the East. Some of the later Roman emperors, as Diocletian and Constantine the Great, selected it for their temporary residence. Later it suffered greatly both from earthquakes and the attacks of the Goths. Constantine died at a royal villa in the immediate vicinity. Hannibal committed suicide in a castle close by. It was the birthplace of the historian Arrian. The place was captured by the Turks in 1338. The town of Ismid or Isnikmid now occupies its site, and contains many relics of ancient Nicomedia. Consult K. Baedeker, *Konstantinopel, Balkanstaaten, Kleinasien, Archipel, Cypern* (2d ed., Leipzig, 1914).

NICOP′OLIS (Lat., from Gk. Νικόπολις, *Nikopolis*). A town in the extreme southern part of Epirus, opposite the promontory of Actium, founded in the year 31 B.C. by the Emperor Augustus, who named it the City of Victory, in commemoration of the naval victory won by him near Actium. He decided to make a great city of Nicopolis, gathered a large population into it, and instituted games which drew throngs there every fourth year. The original site of Nicopolis is now deserted, but its extensive ruins are evidence of its former importance. The modern city of Prevesa (Map: Greece, B 4), which is situated about 3 miles distant from the original location of Nicopolis, is the historical successor of the older city. In Titus iii. 12 Paul requests Titus to come to him at Nicopolis, for he had determined to spend the winter there. This is usually taken as relating to Paul's later movements after his release from his first imprisonment at Rome 59–61 A.D., and as indicating missionary activity on his part in northwestern Greece and the neighboring region.

NICOPOLIS. A town of Bulgaria (Map: Greece, Anc., B 2). See NIKOPOL.

NICOSIA, nē′kō̇-sē′ȧ (more common than the forms LEFKOSIA and LEVKOSIA, of which it is a corruption). The capital and largest city of the island of Cyprus (Map: Turkey in Asia, B 3). It is the seat of the British governor and of an archbishop of the Greek church. It is situated in a barren plain, a little northeast of the centre of the island, on the river Pedias, which is dry most of the year. From a distance the high walls built by the Venetians and the beautiful Gothic cathedral of St. Sophia, now a mosque, render Nicosia attractive, but the streets are narrow and labyrinthine. The city has a number of churches, a library, and bazars. The manufactures are silks, leather, and woolen stuffs. Pop., 1891, 12,515; 1901, 15,752; 1911, 16,052. The city first appears in history in the time of Constantine, who fortified it with walls that lasted until the Venetians replaced them. It became the capital under the Lusignan kings, to the first of whom, Guy de Lusignan, the island was given in 1193 by Richard Cœur de Lion. Consult *Levkosia, the Capital of Cyprus* (London, 1881), also Lukach and Jardine, *Handbook of Cyprus* (ib., 1913).

NICOSIA, nē′kō̇-zē′ȧ. An episcopal city in the Province of Catania, Sicily, situated in a mountainous region, on the Salso, 25 miles northeast of Caltanissetta (Map: Italy, E 6). The town is said to have kept more of its mediæval atmosphere than any other in Sicily. It has a Gothic cathedral, several ancient churches and many quaint houses. It carries on some trade in corn, wine, oil, and cattle. Near it are beds of alum and sulphur, a rich mine of rock salt, and sulphur springs. Pop. (commune), 1901, 16,004; 1911, 16,441.

NICOT, nē̇′kō′, JEAN, SIEUR DE VILLEMAIN (1530–1600). A French diplomat, born at Nîmes. He was appointed by Francis II Ambassador to Portugal in 1560. During his residence at Lisbon he obtained from a Flemish trader some seeds of the tobacco plant, which he took back with him to France, where the plant was named *Nicotiana* in his honor. He published a *Historia Francorum* (1566) and a *Trésor de la langue française* (1606), one of the earliest French dictionaries.

NICOTERA, nē̇-kō′tȧ-rȧ, GIOVANNI, BARON (1828–94). An Italian statesman, born at San Biase (Calabria). He took an active part in the revolution of 1848–49, fought in Calabria and Rome, but having been wounded, retired in 1849. In 1857 he accompanied Mazzini in his expedition against the Bourbons in Naples, and, being taken prisoner at Sanza, was condemned to death. Through the influence of England this sentence was commuted to imprisonment for life. In 1860 he was set at liberty again by Garibaldi, whom he joined. He was concerned in all of the political movements of the succeeding years, and was at all times a supporter of Victor Emmanuel. After the establishment of the Kingdom of Italy, he was Minister of the Interior under Depretis (1876–77), but was obliged to resign because of his strong opposition to the Premier. Nicotera again held the same portfolio during the premiership of Rudini (1891–92).

NICOTIANA, nĭ-kō'shĭ-ā'nȧ. A genus of dicotyledonous plants belonging to the Solanaceæ (nightshade or potato family) and best known as tobacco. The genus contains about 50 species, mostly American. See TOBACCO.

NIC'OTINE (Fr. *nicotine,* Sp. *nicotina,* from Fr. *nicotiane,* tobacco, named in honor of Jean Nicot), $C_{10}H_{14}N_2$. One of the vegetable alkaloids that contain no oxygen; it constitutes the active principle of the tobacco plant, in the leaves, roots, and seeds of which it occurs in combination with malic and citric acids. The smoke of burning tobacco leaves contains but a mere trace, if any, of nicotine; which does not prove, however, that tobacco smoke is harmless, for its other ingredients are probably more or less injurious to health. Nicotine is a colorless, intensely poisonous liquid, of specific gravity 1.027 at 66° F. (34° C.); it boils at 466° F. (241° C.), evolves a very irritating odor of tobacco, especially on the application of heat, is very inflammable, and burns with a smoky flame. It is soluble in water, and dissolves readily in alcohol and ether. If exposed to the air, it absorbs oxygen and becomes brown and ultimately solid. Aqueous solutions of nicotine itself turn the plane of polarized light to the left; solutions of its salts, on the contrary, are dextrorotatory. The quantity of nicotine contained in tobacco varies from 2 to 8 per cent, the coarser kinds containing the larger quantity, while the best Havana cigars seldom contain more than 2 per cent, and often less. Turkish tobacco contains scarcely any.

In 1904 Pictet and Rotschy succeeded in producing synthetically not only the ordinary nicotine of tobacco described above, which turns the plane of polarized light to the left, but also the optically antipodal nicotine, which does not exist anywhere in nature. Mayor has studied the difference in physiological action between the levo and dextro varieties of nicotine, and has found them quite different, not only in degree of intensity, but in the mode of action. See ALKALOIDS.

NICOYA, nê-kō'yȧ, GULF OF. An inlet of the Pacific Ocean, on the west coast of Costa Rica, formed by a peninsula ending in Cape Blanco (Map: Central America, E 6). It is about 60 miles long and 20 to 30 miles wide, and is lined on both sides with high and picturesque mountains. On its east shore lies Punta Arenas, the only port of entry on the Pacific coast of Costa Rica.

NICTHEROY, nĭk'tĕ-roi'. The capital of the State of Rio de Janeiro, Brazil, situated on the east side of the entrance to the bay, opposite the city of Rio de Janeiro (Map: Brazil, J 8). The town is not attractive, but it is surrounded by delightful suburbs, where the residences of the wealthy classes are situated. Prior to 1894 Nictheroy was the capital of Rio de Janeiro. Pop. (est.), 40,000.

NIC'TITA'TION (Lat. *nictare,* to beckon). Involuntary winking due to spasm of the orbicularis muscle of the eye and generally associated with neurasthenia, hysteria, or chorea (qq.v.). It is also liable to occur in those subject to eye strain and may arise from reflex nerve disturbances in various parts of the body. In some cases it can only be explained on the basis of habit. Where the eyes are directly at fault, correcting lenses and rest of the accommodative muscles are necessary.

NID'IFICA'TION (from Lat. *nidificare,* to make a nest, from *nidus,* nest + *facere,* to make). Strictly, the act and process of nest building. In the present article, however, the word will be broadly interpreted, so as to include the entire series of acts, instincts, and adaptations connected with the provision of a temporary breeding home, nidus, or nest for their eggs, embryos, or young, and the care of offspring, by the parents of animals generally.

A nest differs from an animal's ordinary residence in that it is not made primarily for the animal's own use, but for that of expected young. In some instances it is mainly a convenient lying-in place for the mother; in others, merely a means for the safety and well-being of eggs or helpless embryos; but often it combines these purposes and adds to them that of a nursery. The last phase is illustrated by certain social insects, some birds, a few mammals, and in human society. In the lowest ranks of invertebrate life, and to some extent among animals of comparatively high organization, the eggs, or spawn, are simply voided into the water or earth and left to survive or perish, unregarded by the parent. Some animals, however, produce comparatively few eggs, protected against many dangers by being placed within one or more envelopes or capsules. (See EGG.) Another widespread method is that of retaining the embryo in the maternal body until it is able to shift for itself. This is seen in many invertebrates and in some fishes. These animals are therefore known as ovoviviparous.

Maternal Care of Eggs. An advance upon this is made by a large class of creatures which carry their eggs about with them until they hatch, and in some cases even continue to care for the young, although they make no nest. Examples of this are to be found in all classes of animals, from mollusks and crustaceans up to a few of the lowest birds; and some of the brooding habits and physical adaptations thus manifested are surprising. Thus, the female argonaut (q.v.) has developed an elaborate boat-like shell in which her eggs and embryos rest secure; the violet snail (q.v.) (*Janthina*) drags hers beneath a raft; and other instances are citable. Spiders' eggs are covered with silk, forming a bag or ball of various shapes and colors. (See SPIDER.) Crustaceans almost universally keep their eggs with them. Some insects inclose their eggs in packets and take care of them, much as do the crabs, but most insects simply deposit their eggs so that the resulting larvæ shall be within reach of suitable food, and do not know what becomes of them. It is not until the highest grades of Hymenoptera are reached—the wasps, bees, and ants—that anything which may be called a nest is made in preparation for the eggs or young, or any parental care is exerted. (See ANT; BEE; INSECT, *Social Insects;* WASP.) The equal of this is hardly to be found among vertebrates until man is reached—and even then only among men in a somewhat advanced stage of culture.

Fishes and Reptiles. Among fishes a certain amount of instinct is adapted to the best interests of the young. Thus, many kinds migrate long distances to seek the water or food proper for the young, but, a suitable general surrounding having been obtained, little or no further care is taken. Only a few species build nests. Certain kinds make very crude nests, such as the hollow scooped out in the sand or some clean, sunny bottom by the male sunfish, or the more elaborate structures of sticklebacks (see STICKLEBACK) and gobies (see GOBY). Amphibians and reptiles rarely make anything which may be called a nest, but some care for their eggs in very curious ways elsewhere described.

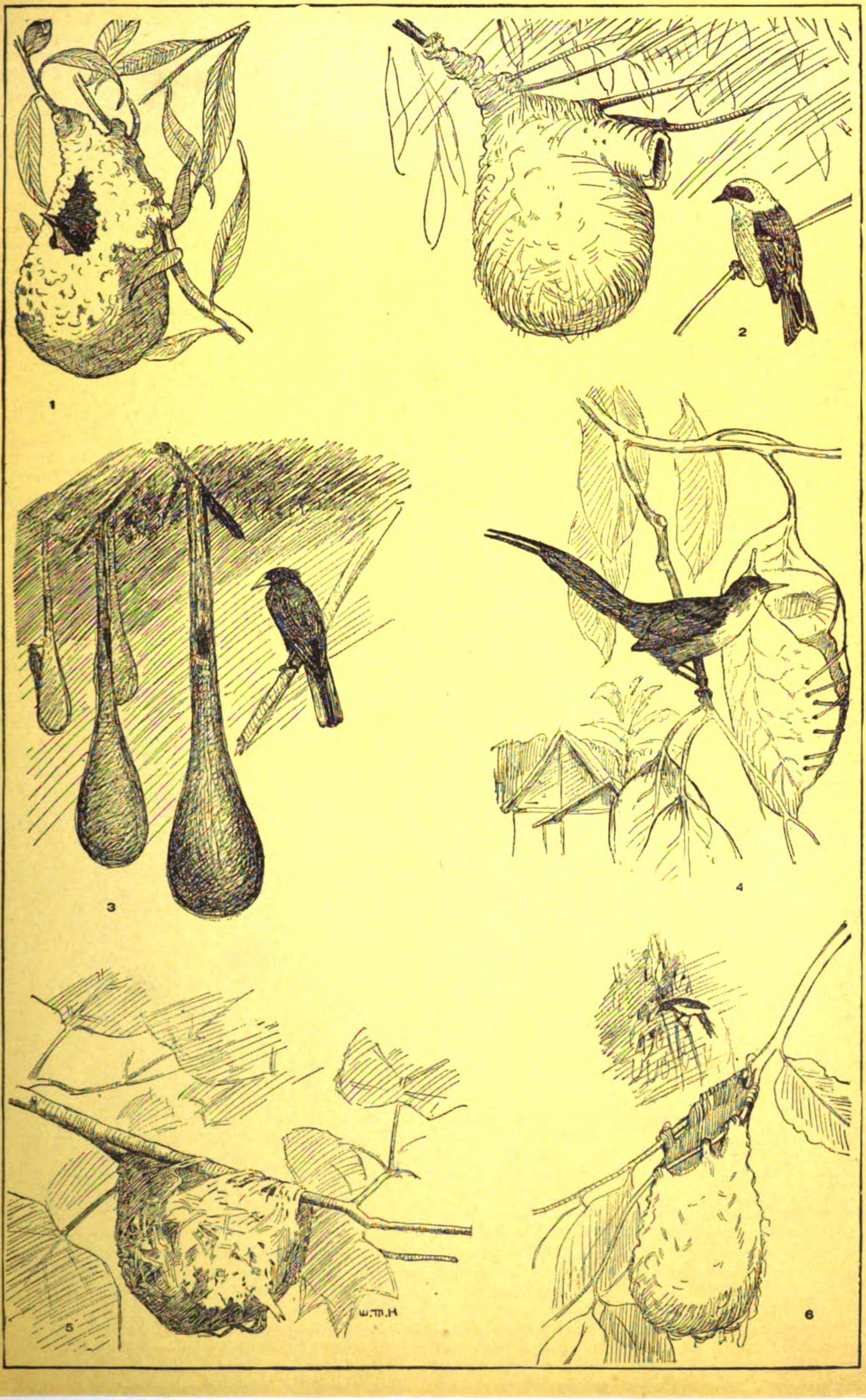
Birds. The nest making of birds is most familiar and perfect, yet it is only among the higher forms that it is manifested to any great extent. In no respect is there greater diversity among birds than in the structure of the nest. As a rule, its character is closely associated with the intelligence of the bird, modified more or less by the necessities of the situation and the structure of the bird's bill and feet. The nests of ostriches and other Ratitæ are mere accumulations of sand or earth, or cavities scraped in the ground. The nests of the lowest water birds consist of burrows in the ground, or the eggs are laid on bare earth or rock. Good examples are the guillemots (see GUILLEMOT). The king penguin treats its eggs the same way. Among those a little higher in the scale, nests of seaweed and coarse grass loosely put together make a home for the young. Most of the ducks and geese build nests of grass, and often include feathers from their own bodies, a habit carried to the extreme in the eider duck (q.v.). Few of the wading birds build nests, the herons coming nearest to it with a platform of sticks. The grouse and quail, turkey and pheasant, all scrape together nests of leaves and grass on the ground. The allied mound birds are remarkable for collecting great heaps of decaying vegetable matter, in which the eggs are laid, the heat caused by the decay ripening them. Doves and pigeons usually build a very frail nest of twigs, but a few species are ground breeders. Eagles, hawks, and vultures construct coarse, heavy nests of sticks and twigs on large trees or cliffs, while owls often resort to hollows in trees, or to the deserted burrow of some mammal, especially the prairie dog. Parrots, woodpeckers, kingfishers, mouse birds, todies, and some others lay their eggs in holes in trees, or in earthen banks, with little or no bedding. Humming birds (see HUMMING BIRD) build the most delicate and beautiful nests known; and swifts extraordinary ones, largely from mucilaginous saliva. (See CHIMNEY SWIFT; SALANGANE.) Many song birds build on the ground, where the nest is more or less cleverly concealed, but the great majority build in trees or bushes. The most remarkable nests built by any birds are those of the American orioles or hangnests, and more especially of the weaver birds (q.v.) of Africa and the East Indies.

The perfection of many nests for the purposes to which they are put, and the ingenuity, skill, and apparently æsthetic sentiment displayed by many birds, long ago led to some study and much speculation. An excellent book was made upon the subject early in the nineteenth century—Rennie's *Architecture of Birds* (Boston, 1831); and about 40 years later Wallace included in his book *Contributions to Natural Selection* (London, 1870) an essay on "A Theory of Birds' Nests," in which he discussed the subject from an evolutionary point of view, showing the analogy between the method of birds and primitive men in meeting their diverse requirements of shelter out of the materials most available. Wallace places birds' nests in two great classes —a functional, not a structural, classification. The first class includes those in which the eggs, young, and brooding parents are not exposed. To this group belong nests that are built in natural covers, such as holes in trees or in banks and cliffs, as well as nests covered by the bird, such as the suspended nest of the American orioles. To the second class belong the nests of the ordinary type, cup-shaped and open above, so that the eggs, young, and brooding females are exposed. This contrast in method of nidification, as he believed, correlated with the color of the female. As he says: "When both sexes are of strikingly gay and conspicuous colors, the nest is of the first class, or such as to conceal the sitting birds; while, whenever the male is gay and conspicuous, and the nest is open so as to expose the sitting bird to view, the female bird is of dull or obscure colors." The comments and criticisms upon this theory by the Duke of Argyle, by Prof. A. Murray, and by J. A. Allen (*Bulletin Nuttall Ornithological Club*, vol. iii, Cambridge, 1878), and by others more recently, show that it is not so universal in its application or fully explanatory as its author considered it. The hypothesis was restated, with improvements, by Wallace, in *Darwinism* (New York reprint, 1889).

The more recent philosophic view, well summarized by Chapman (*Bird Life*, New York, 1898), is that, apart from and above the various considerations already mentioned, the necessity for protection of the eggs and young from physical accidents, loss of heat, and seizure by enemies is the real motive; and the superior excellence as cradles of the nests of birds of the higher orders is explained by the fact that these orders are altricial—i.e., their young are born in a helpless condition, must be cared for by the parents for a considerable time, and hence both old and young need much better and safer quarters than do the precocial birds, whose young (e.g., chickens) run about at birth and have no need of a nursery.

Wallace also treated of the belief formerly prevalent that birds work by instinct and never make any improvement during their lifetime in nest building. He asserted that the chief mental faculties so exhibited by birds are the same in kind as those manifested by mankind in the formation of their dwellings—i.e., essentially, imitation and a slow and partial adaptation to new conditions. In answer to the objection that it is not so much the material as the form and structure of nests that varies, Wallace replied that such diversities may be explained in a great measure by the general habits of the species, the nature of their tools, the materials they can most easily obtain, and differences of habitat and needs that may have occurred within the period of existing species, due to changes in climate, the earth's surface, food, and so forth. Birds learn something, doubtless, in regard to the size, structure, and material of the nest of their own species before they leave it. Wallace quotes a number of cases of birds reared in the nests of other birds that sang only the song of the foster parent, learned while in the nest. Then, too, young birds do not always mate with birds of their own age, and the young bird learns nest building from its more experienced mate. It is not unusual to see one bird of a pair, say an English sparrow, redisposing the material that the other bird has just put in place. Several observers have stated that young birds build less perfect nests than old birds, and Wallace quotes one instance in which some young chaffinches were taken to New Zealand and there

PENSILE NESTS OF BIRDS



1. AUSTRALIAN FLOWER-PECKER (Dicæum hirundinaceum).
2. EUROPEAN PENDULINE TITMOUSE (Ægithalus pendulinus).
3. BRAZILIAN CRESTED CACIQUE (Ostinops citrius).
4. INDIAN TAILOR BIRD (Orthotomus sutorius).
5. RED-EYED VIREO (Vireo olivaceus).
6. BALTIMORE ORIOLE (Icterus galbula).

set free. They built a nest in the new home which showed "very little of that neatness of fabrication for which this bird is noted in England." It is an oft-repeated observation that the nests of the Baltimore oriole, when built near the habitations of man, differ in shape and structure from those in the wilds where twine and threads are not at hand and where there is more necessity of concealment from hawks and snakes. The swallows and swifts of all parts of the world are quick to change their nesting places from hollow trees and rocky cliffs or caverns to the porches, barns, and chimneys of men's habitations, and changes in the style of their architecture follow. The nests of house wrens and purple martins vary with the situations chosen. The orchard oriole may build a shallow nest in stout branches or deep ones in swaying willows.

Brooding of Birds. The eggs of birds are hatched by the steady application of warmth for a sufficient time to mature the embryo to the stage when it breaks from the shell. This necessary warmth (about 105° F.) is secured by the bird covering the eggs with its body, sitting upon or incubating them almost continuously for a length of time which in a general way is proportioned to the bird's size. No very extended and accurate observations on this point have been recorded; the best are those by Evans in *The Ibis* (London) for 1891 and 1892, and Burns in *The Wilson Bulletin* (Chicago) for 1915. Broadly speaking, most of the small song birds hatch their young in from 13 to 15 days, but the very smallest may take less time—the humming bird, it is said, only 10 days. In canaries it is from 15 to 18 days; in the common fowl it is 21 days; in the duck it is from 28 to 30 days; in the guinea fowl it is 28 or 29 days; in the turkey 30 days; and in the swan from 40 to 45 days. The emu is said to sit 50 days. Small altricial birds usually begin sitting after the first egg is laid; but game birds and waterfowl rarely begin to sit until the whole clutch is in the nest, so that the whole brood shall hatch simultaneously.

It is in most birds the function of the female to perform the duties of incubation, during which she is to a greater or less extent defended, fed, and cheered by her mate. Twice or oftener each day she leaves the nest for rest and to get food, and the male takes her place for an hour or two. It sometimes happens that if she is killed, the male concludes the process of incubation and cares for the young. In some groups he does the entire duty of sitting. This seems to be universally true of the ostrich and other ratite birds, and is the practice of the godwits, phalaropes, and certain other shore birds. Both sexes join in the care of the young at first, but in most cases their education is gradually left entirely to the mother.

Nests of Mammals. Among the mammals, a nest in the present sense of the word is not common. The female, when about to bring forth young, is either already in a den or lair which has been a family residence during the winter or is permanently so, or else requires no more accommodation than a retired corner in the midst of a thicket or beneath a sheltering rock. Squirrels, wood rats and mice (see MOUSE), however, often construct in bushes and trees, or among grass or low brush, globular nests of leafy twigs or of grass in which the young are born. The lodges of the beaver, muskrat, coypu, and the like, elsewhere described, are family houses in which the protection of the young is probably the prime desideratum. Hardly different, and by no means so elaborate, are the platforms or nests of the anthropoid apes, and especially of the orangs (see ORANG-UTAN), where the young are born, but in which they do not long remain. There is, however, little to choose between these structures, or their advantage to the young, and those of many nomadic savages, such as the aboriginal Bushmen of South Africa, the northern Australians, or the Indians of the Utah basin and deserts of Arizona and Chihuahua.

Consult standard works on zoölogy, especially J. Rennie, *Architecture of Birds* (Boston, 1831); Newton, article "Nidification," in *Dictionary of Birds* (London, 1893–96); Oliver Davie, *Nests and Eggs of American Birds* (5th ed., Columbus, 1898); *Cambridge Natural History*, vols. iii–x (London, 1898–1902); A. R. Dugmore, *Bird Homes: The Nests, Eggs, and Breeding Habits of the Land Birds Breeding in the Eastern United States* (New York, 1900); F. H. Herrick, *The Home Life of Wild Birds* (ib., 1902); Richard Kearton, *British Birds' Nests* (London, 1913). See also works cited under EGG.

NID'ULA'RIA'LES. An order of Basidiomycetes (q.v.) known as nest fungi because the puffball-like sporophore upon opening forms a cuplike structure in which the chambers containing spores have become free and lie like eggs in a nest.

NIEBUHR, nē'bōōr, BARTHOLD GEORG (1776–1831). A German historian and philologist, born Aug. 27, 1776, at Copenhagen, where his father, Carsten Niebuhr, then resided. He showed singular aptitude for learning in his earliest youth, and his powers of acquiring knowledge kept pace with his advancing years. After preliminary education under the superintendence of his father, he studied law and philosophy at Kiel, and then went to Edinburgh, where he devoted himself more especially to the natural sciences. On his return to Denmark he became private secretary to the Finance Minister, Schimmelmann, and from that period held several appointments under the Danish government, being made director of the government bank in 1804. He entered the Prussian civil service in 1806, and during the three succeeding years he shared in the vicissitudes which befell the government of his chief, Count Hardenberg. The opening of the University of Berlin in 1810 opened a new era in the life of Niebuhr. He resigned his government position and gave at the university a course of lectures on Roman history, which, by making known the results of the new critical methods which he had applied to the elucidation of obscure historical evidence, established his position as a leader in the scientific study of history and effected an important change in historical method. In 1813 he reëntered the government service. Appointed in 1816 Prussian Ambassador at the papal court, Niebuhr was enabled to verify many of his conjectures and test his methods by the actual sources of ancient Roman history. On his return from Rome in 1823, where Baron Bunsen, his secretary, succeeded him, Niebuhr took residence at Bonn, where he delivered classical and archæological lectures and expositions. The revolution of 1830 again stirred his interest in public affairs. He died Jan. 2, 1831. Niebuhr's scholarship was broad, vigorous, and independent. He was an accomplished linguist and a philosophical and scientific thinker. He was a path breaker in the modern method of historical criticism, and while all his conclusions are not accepted to-day, he showed the way by which they might be tested in the light of more complete knowledge. He was the founder of the Rheinisches Museum at Bonn. Among his important works are: *Römische Geschichte* (3 vols., Berlin, 1811–32; new ed., 1873; the first two volumes translated by Hare and Thirlwall and the third by Smith and Schmitz); *Griechische Heroengeschichte* (1842; 11th ed., 1896), written for his son Marcus; *Geschichte des Zeitalters der Revolution* (1845). The *Kleine historische und philologische Schriften* (1828–43) contains his introductory lectures on Roman history and many of the essays which had appeared in the transactions of the Berlin Academy. Besides these and numerous other essays on philological, historical, and archæological questions, Niebuhr coöperated with Bekker and other learned annotators in reëditing the *Scriptores Historiæ Byzantinæ;* he also discovered hitherto unprinted fragments of classical authors, as, e.g., Cicero's *Orations* and portions of Gaius; published the *Inscriptiones Nubienses* (Rome, 1821); and was a constant contributor to the literary journals of Germany. His *Lectures on Ancient History* is familiar in English translation.

Bibliography. Dorothea Hensler, *Lebensnachrichten über B. G. Niebuhr,* 3 vols. (?1838–39); Winkworth, *Life and Letters of Niebuhr* (London, 1852); Johannes Classen, *Barthold Georg Niebuhr: eine Gedächtnisschrift* (Gotha, 1876); Francis Lieber, "Reminiscences of an Intercourse with Niebuhr," in *Miscellaneous Writings* (Philadelphia, 1884); bibliography and article in *Allgemeine deutsche Biographie,* vol. xxiii (Leipzig, 1886); Franz Eyssenhardt, *B. G. Niebuhr* (Gotha, 1886); J. E. Sandys, *History of Classical Scholarship* (London, 1908); G. P. Gooch, *History and Historians in the Nineteenth Century* (ib., 1913).

NIEBUHR, Carsten (1733–1815). A German traveler, born at Lüdingworth, Hanover. He entered the University of Göttingen, and in 1760 became a lieutenant of engineers in the Danish army. The next year he sailed with the expedition sent out by Frederick V of Denmark to explore Egypt, Arabia, and Syria. His companions, the best known of whom was the naturalist Forskål (q.v.), all died of hardship or disease, but Niebuhr continued alone and only after six years of wandering did he return to Europe. The results of his observations appeared in *Beschreibung von Arabien* (1772), *Reisebeschreibung von Arabien und andern umliegenden Ländern* (1774–78), and *Reisen durch Syrien und Palästina* (1837). He also brought out the results of Forskål's work under the titles *Descriptiones Animalium* (1775), *Flora Ægyptiaco-Arabica* (1776), and *Icones Rerum Naturalium* (1775–76). In 1778 Niebuhr entered the civil service and removed from Copenhagen to Meldorf in Holstein, where he died. Consult *Carsten Niebuhrs Leben* (1816), by his son, Barthold Georg Niebuhr (q.v.), an English version of which, by Mrs. Sarah Taylor Austin, was published in the *Lives of Eminent Persons* (London, 1833).

NIECKS, nēks, Frederick (1845–). A British authority on music, of German birth and parentage. He was born in Düsseldorf, where, after study under native teachers, he was a violinist and a teacher until 1868. Then, removing to Scotland, he became organist at Dumfries, and played viola in A. C. Mackenzie's string quartet. Subsequently he became critic for the *Monthly Musical Record* and Novello's *Musical Times.* From 1891 to 1914 Niecks was Reid professor of music and dean of the music faculty at Edinburgh University. Considered one of the highest musical authorities in Great Britain, his works include: *Dictionary of Musical Terms* (1884); *Frederick Chopin as a Man and Musician* (1888); *Programme Music in the Last Four Centuries* (1907).

NIEDERMANN, nē′dẽr-mȧn, Max (1874–). A Swiss Latinist, born at Winterthur. He was educated at the Gymnasium of Winterthur and at the universities of Zurich, Basel, and Freiburg. After completing his studies under the direction of Meillet at the Ecole des Hautes-Etudes in Paris, he was appointed head master of the Gymnasium at La Chaux-de-Fonds, Switzerland, in 1900, a position that he continued to fill until 1906. In 1903 he was elected privatdocent in the University of Neuchâtel, and two years later was promoted to be professor extraordinary. Appointed in 1909 to a similar position at Basel, within a year Niedermann was recalled to Neuchâtel to the chair of comparative philology. After 1911 he held also the corresponding professorship at Basel. His works include: *"e" und "i" im Lateinischen* (1897); *Contributions à la critique et à l'explication des gloses latines* (1905); *Précis de phonétique historique du latin,* with an introduction by Meillet (1906; in German as *Historische Lautlehre des Lateinischen,* 1911, and in English with title *Outlines of Latin Phonetics,* edited by Strong and Stewart, 1910); *Proben aus der sogenannten Mulomedicina Chironis* (1910).

NIEDERMEYER, nē′dẽr-mī′ẽr, Louis (1802–61). A Franco-Swiss composer, born at Nyon, Switzerland. He studied under Moscheles and other eminent masters at Vienna and Rome. His first opera was produced at Naples, but of several composed by him, *Stradella* (1837) was the only one which had success. He also set to music a number of songs by Victor Hugo, Lamartine, and Manzoni. Dissatisfied with the meagre success of his secular work, he turned to church music and achieved real success. The Ecole Niedermeyer, founded by him, subsequently came under government subvention, and equally favorable results attended his journal *La Maîtrise,* which became a very influential musical factor. He died in Paris, and a bust of him has been placed in the foyer of the Grand Opéra.

NIEDERWALD, nē′dẽr-vält. The finely wooded southwestern spur of the Taunus, in the Prussian District of Wiesbaden, near the Rhine. Its height is about 1100 feet. On it, opposite Bingen, stands the national monument commemorating the War of 1870–71 with France. The pedestal, 82 feet in height, is richly decorated with reliefs and allegorical figures. On it stands a bronze figure of Germania, 34 feet high, holding the Imperial crown, typifying the formation of the Empire. The monument is the work of Schilling of Dresden. It was unveiled on Sept. 28, 1883, when an anarchistic plan for dynamite explosion was frustrated by the damp weather. The two ringleaders of the attempt were executed in 1885.

NIEHAUS, nē′hous, Charles Henry (1855–). An American sculptor, born in Cincinnati, Ohio, Jan. 24, 1855. He studied at the McMicken School of Design (Cincinnati) and in Munich, where his "Fleeting Time" won the first medal ever awarded to an American. His first commission on his return was the Garfield Monument at Cincinnati, a work he never surpassed. This was followed by statues of Garfield and of William Allen for the Capitol in Washington, the latter a particularly dignified and able portrait. He then left America to study classical sculpture in Rome. "Cæstus" (Metropolitan Museum, New York) and "The Scraper," two realistic-classic nude figures, were modeled at this period. On his return in 1885 he settled in New York. His great talent is best displayed in his monumental works, which are always admirably sculptural in conception, simple and dignified in composition, and of severe purity of line and handling. Among the best known, besides the Garfield Monument, are the statues of Hooker and Davenport, for the Connecticut State Capitol; of Hahnemann (Scott Circle, Washington); of Lincoln, at Muskegon and Buffalo; of McKinley (and lunette for the McKinley Mausoleum) at Canton, Ohio; the equestrian statue of General Forrest at Memphis, Tenn.; the monuments to Benjamin Harrison, at Indianapolis, to Beardsley, at Bridgeport, Conn., and to John Paul Jones, at Washington; and the bronze doors for Trinity Church, New York City, given in memory of John Jacob Astor. The six reliefs of religious and historical subjects decorating these doors are fine examples of delicate workmanship and an original method of combined high and low relief. Other notable works are the pediments of the Appellate Court Building, New York City, and of the State Capitol at Frankfort, Ky.; the two large groups representing "Mineral Wealth" at the Pan-American Exposition of 1901; and the nude figure of "The Driller" on the Drake Monument in Titusville, Pa. The fine portrait busts of Disraeli, Joseph Jefferson, and Rabbi Gottheil should also be mentioned. Niehaus became a National Academician (1906), and was awarded gold medals at Buffalo in 1901, at Charleston in 1902, and at St. Louis in 1904. Consult Armstrong, *Charles Niehaus* (New York, 1902), and Lorado Taft, *History of American Sculpture* (ib., 1903).

NIEHEIM. See NIEM.

NIEL, nē'ĕl', ADOLPHE (1802–69). A French marshal. He was born at Muret, Haute-Garonne, and was educated at the Ecole Polytechnique and at the military academy of Metz. He became lieutenant of engineers in 1827, captain in 1835, and served in Algeria in 1836–37, gaining the rank of *chef de bataillon* by his courage. He commanded the engineers in the army of Oudinot, which put an end to the Roman Republic in 1849, and became brigadier general and director of the engineer department in the Ministry of War. As general of division he conducted the operations which destroyed the Russian fortress of Bomarsund in August, 1854. At the head of the engineers in the Crimea he directed the siege operations around Sebastopol. During the Italian War of 1859 his services at Magenta and Solferino made him marshal. In 1867 he became Minister of War.

NIELLO, nĭ-ĕl'lō (means "black work" and is the Italian form of Lat. *nigellum*, which is dim. of *nigrum*). A method of ornamenting silver, gold, or bronze with line inlay of black metallic amalgam. It dates from ancient Egypt, and the process was described in the first century A.D. by Pliny, in the eleventh century by Erachis, in the twelfth century by Theophilus, in the sixteenth century by Cellini and by Vasari. The design is cut with a burin, and filled with an amalgam of silver, copper, and lead, to which when fluid an excess of powdered sulphur has been added. Niello is most effective on silver because of the strong contrast between the white ground and the black ornament. The art flourished most during the Middle Ages and the Renaissance, in the Byzantine Empire and in Italy, and is said to have led to the invention of printing from engraved metal plates. (See LINE ENGRAVING.) Of the niello portrait of the Virgin in the Opera del Duomo at Florence, made in 1452 and wrongly attributed by Vasari to Maso Finiguerra, there were prints made which are preserved in the Louvre, the British Museum, and other collections. Niello is still employed in Russia, where it was inherited with the other arts directly from Byzantium, and in India, where it has flourished for centuries. The earliest specimens of niello date from near the time of Christ. The bronze statue of a Roman general, nearly 2 feet high, in the British Museum, with dress and armor inlaid partly in silver and partly in niello, is attributed to the first century A.D. It was discovered at Barking Hall in Suffolk. The silver toilet case in the British Museum, containing an ampulla and other small objects, is attributed to the fourth century. One of the most important examples of Byzantine work is the silver baldachin over the high altar of Santa Sofia. In the church of Hanover Palace is a silver platen bearing figures in niello, attributed to Bernward of Hildesheim, who died about 1023. Other nielli by him are preserved in the Hildesheim Cathedral. Consult: Jean Duchesne, *Essai sur les nielles gravures des orfèvres florentins du XVème siècle* (Paris, 1826); Edmund Waterton, in *Archæological Journal*, vol. xix (London, 1862); Ludovic Vitet, *Etudes sur l'histoire de l'art*, vol. iv (new ed., Paris, 1875); Cyril Davenport, in *Journal of the Society of Arts*, vol. xviii (London, 1901). For description of process, see H. Wilson, *Silverwork and Jewelry* (ib., 1912). See ENAMEL.

NIELSEN, nĕl'sĕn, ALICE (1876–). An American dramatic soprano, born at Nashville, Tenn. She studied music under Mademoiselle Ida Valerga in San Francisco; from 1893 to 1902 starred in comic opera at home and abroad; then went to Rome for study and appeared at La Scala, Milan, in 1903, and, as Marguerite in *Faust*, at the Bellini Theatre, Naples. For the next few years she sang in London, at Covent Garden and at the New Waldorf Theatre. Subsequently she toured the United States with the Don Pasquale and San Carlo companies; was a member of the Boston Opera in 1910–11; and joined the Metropolitan Opera, New York, in 1910. She was married to Benjamin Nentwig in 1892.

NIELSEN, YNGVAR (1843–). A Norwegian historian, geographer, and ethnographer, born at Arendal. Educated at the University of Christiania, he was assistant in the National Archives (1869–78), and then was connected with the university, becoming professor in 1890. His works include: *Bidrag til Norges Historie in 1814* (2 vols., 1886); *Norges Historie efter 1814 (–37)* (3 vols., 1892); *Lensgreve J. C.*

H. Wedel-Jarlsberg 1779–1840 (3 vols., 1902), his main work; *Reisehaandbog over Norge* (11th ed., 1908), a classic; in German, *Norwegen, Sweden, und Dänemark* (8th ed., 1903) and *Det halve Kongerige* (1911).

NIEM, nē′ĕm, or **NIEHEIM,** nē′hīm, Dietrich of (?1340–1418). A German chronicler, born in the town of Nieheim in the mediæval bishopric of Paderborn. He received office under the Papal Curia at Avignon, and went with it to Rome in 1376. In 1395 he was made Bishop of Verden (Hanover) by Pope Boniface IX. He appears to have been forced from this dignity by disputes, and in 1403 is met with as abbreviator in the Papal Chancellery. During the subsequent discussions which harassed the church he insisted on internal reforms. He wrote in this connection his three books, *De Schismate* (completed in 1410; printed in 1532 and subsequently), a vivid history of the events of the years 1376–1410, placed by Pope Sixtus V upon the Index. With others of his works, such as the *Historia de Vita Joannis XXIII* (1682) and the *Nemus Unionis,* incorporated with the Basel 1566 edition of the *De Schismate,* the latter forms an important source for historical investigation. Consult the *Life* by Sauerland (Göttingen, 1875).

NIEMANN, nē′män, Albert (1831–). A German dramatic tenor, born at Erxleben. He was at first a singer in the chorus at Dessau. After a thorough training under Schneider and Nusch, his voice attracted the attention of the King of Hanover, who took him into his service. Wagner selected him to sing in *Tannhäuser* on its first production in Paris in 1861 and in the first Bayreuth Festival of 1876. From 1866 until his retirement in 1889 he was a member of the Berlin Royal Opera. In 1886–88 he sang the great Wagner rôles at the Metropolitan Opera House in New York. As a Wagner interpreter he has never been surpassed, and equaled by but few. Consult R. Sternfeld, *Albert Niemann* (Berlin, 1904).

NIEMBSCH VON STREHLENAU, nēmsh fŏn strā′le-nou, Nikolaus. See Lenau, Nikolaus.

NIEMCEWICZ, nyĕm-tsā′vĭch, Julian Ursyn (1757–1841). A Polish author and statesman, born at Skoki, Lithuania. After graduating from a military school he entered the army at 20 as an adjutant and became major in 1788, when he was sent as deputy to the Polish Diet, where he passionately defended the rights of the peasant and middle classes. With a colleague he published the *People's Paper,* and was the framer of the so-called Constitution of the third of May, making monarchy hereditary in Poland (1791). He was Kosciuszko's adviser and aid, and was severely wounded at Maciejowice and taken prisoner with his chief (1794). While imprisoned he translated Pope's *Rape of the Lock* and Gray's *Elegy.* Released after two years, he went to the United States, where he married Mrs. Livingston Kean of New York. On the report of Napoleon's entrance into Poland he left America for his fatherland in 1807. The King of Saxony appointed him Secretary of the Senate in the new Duchy of Warsaw, as well as inspector of schools and member of the Supreme Council of Public Instruction. When Poland came under Russia's control he was retained in office by Alexander I, but he took a most active part in the events of 1830, after which he went into exile. He died in Paris. His *Historical Ballads* (1816–19), which aroused the national consciousness of the Poles, have retained much of their hold on the public, and his *Meditations at Ursynow* are his best lyric poems. *The Envoy's Return,* among his dramatic works, and his novel of manners, *Johann of Tenczyn,* enjoyed a great vogue. The *History of Sigismund III's Reign* (3 vols., 1819) and a *Collection of Memoirs on Ancient Poland* (5 vols., 1822–30) are valuable for the material collected. A collection of his works was published in Leipzig (1838–40), but it is incomplete. Consult a biography in Polish, by A. Czartoryski (Berlin, 1860), and the *Memoirs* (Pamientniki, 1876–77, 1912) and the *Lithuanian Letters* of Niemcewicz (1812).

NIEMEN, nē′men, *Pol pron.* nyĕm′ĕn. A river of Russia and Prussia (Map: Russia, B 3). It rises near the city of Minsk and flows westward to Grodno, where it becomes navigable. Thence it flows northward, forming the boundary between West Russia and Poland; turning again westward at Kovno, it enters East Prussia, where it takes the name of Memel, and empties into the Kurisches Haff through a large compound delta beginning near the city of Tilsit. The great amount of sediment deposited at its mouth has caused a notable diminution in the size of the Haff. Its total length is 490 miles. It is of considerable commercial importance, being the outlet for large quantities of timber and grain from Russia. Its navigation is extended through several canal systems. Its banks are mostly low and often marshy, and in the delta they are protected from inundations by large dikes.

NIEMEYER, nē′mī-ēr, August Hermann (1754–1828). A German educator and theologian. He was born at Halle and after finishing his studies was appointed professor of theology in the university (1779). In 1807 Niemeyer was carried to France as a hostage. The next year, on his return, he became chancellor, a member of the legislature of the Westphalian Kingdom, and rector perpetuus of the University of Halle. When the city fell to Prussia in 1814 he remained chancellor. As a theologian he held to a moderate rationalism; but even his theological works were tinged with the views of an educator, and in the latter character he did his most important work. Among Niemeyer's works the chief are: *Charakteristik der Bibel* (1795; 2d ed., 1830); *Handbuch für christliche Religionslehrer* (1805–07; 7th ed., 1829); *Leitfaden der Pädagogik und Didaktik* (1802; 2d ed., 1814).

NIEMEYER, Felix von (1820–71). A German physician. He was born at Magdeburg, where he practiced medicine after studying at Halle, Prague, and Vienna. At the time of the cholera epidemic of 1848–49 he published *Die symptomatische Behandlung der Cholera mit besonderer Rücksicht auf die Bedeutung des Darmleidens.* In 1853 he became head of the medical department of the city hospital at Magdeburg, and two years afterward was appointed professor at Greifswald, whence in 1860 he went to Tübingen. Niemeyer's great work, *Lehrbuch der speziellen Pathologie und Therapie* (1858 et seq.; 11th ed., 1884), met with immediate success and proved one of the most important medical works of the century.

NIEMEYER, Theodor (1857–). A German international lawyer, born at Boll, Württemberg. He studied at Leipzig, Heidelberg, and Berlin, and in 1888 graduated at Halle, where he became lecturer. He was appointed assistant professor in 1893 and in the following year full professor of Roman and international law at Kiel (rector, 1907), and he lectured also on international law at the Naval Academy at Kiel after 1895. In 1914–15 he was to have been Kaiser Wilhelm visiting professor at Columbia, but was called on for military service. His publications include: *Das in Deutschland geltende internationale Privatrecht* (1894); *Vorschläge und Materialien zur Kodifikation des internationalen Privatrechts* (1895); *Das internationale Privatrecht des Bürgerlichen Gesetzbuchs* (1901); *Internationales Rechts und nationales Interesse* (1907); *Das Seekriegsrecht nach der Londoner Deklaration* (1910); *Handbuch des Seekriegsrecht* (1912).

NIEPCE, nē'ĕps', JOSEPH NICÉPHORE (1765–1833). A French scientist, born at Châlon-sur-Saône. He entered the Revolutionary army in 1792, but two years later was compelled to resign because of ill health, and in 1795 became civil administrator of the District of Nice. In 1801 he returned to his native town and thenceforth devoted himself to the study of chemistry and mechanics. During the following years he made a number of inventions, and in 1813 turned his attention to the production of pictures upon metal plates by means of light. In 1824 he discovered a process by which he could fix the images of the camera obscura. Two years later he entered into relations with Daguerre, and in 1829 the two formed a partnership to "coöperate in perfecting the discovery invented by M. Niepce and perfected by M. Daguerre." Article V of their agreement says that Niepce gave "his invention" and Daguerre "a new contrivance of the dark chamber, his talents, and his education"; so that if the title "inventor of photography" can be applied to any one man it seems that it should go to Niepce. He died at Gras, near his birthplace, poor and comparatively unknown. He wrote *Notice sur l'héliographie* (1829). Consult: Victor Fouqué, *La vérité sur l'invention de la photographie: Nicéphore Niepce* (Paris, 1867); Ernouf, *Les inventeurs du gaz et de la photographie* (ib., 1877); Alphonse Davanne, *Nicéphore Niepce, inventeur de la photographie* (ib., 1885). See PHOTOGRAPHY.

NIEPCE DE SAINT VICTOR, de săN vĕk'tōr', CLAUDE MARIE FRANÇOIS (1805–70). A French photographer, born at Saint-Cyr, near Châlon-sur-Saône. He served in the army and in 1854 was appointed second commandant of the Louvre. The discoveries in photography made by his uncle, Nicéphore Niepce, jointly with Daguerre, had attracted his attention to that art, and he succeeded in bringing out himself a number of interesting inventions. He was the first to use albumen for photographic purposes, and was one of the first to try photography on glass and to produce steel engravings by a photographic process. He also succeeded in obtaining colored images, which he named *heliochromes;* the colors, however, were fugitive. In 1855 he published the various memoirs in which he had at different times communicated his discoveries to the Academy of Sciences, under the title of *Recherches photographiques,* which was followed in 1856 by *Traité pratique de gravure sur acier et sur verre.*

NIESE, nē'ze, BENEDICTUS (1849–1910). A German classical philologist and historian. He was born at Burg, on the island of Fehmarn, in Schleswig-Holstein, studied at Kiel and Bonn, and in 1877 became professor in the University of Marburg. In 1881 he went to Breslau, but four years later returned to Marburg. From 1906 to his death he occupied the chair of ancient history at Marburg. Niese's publications include: *Die Entwickelung der homerischen Poesie* (1882); *Flavii Josephi Opera* (7 vols., 1885–95); *Geschichte der griechischen und makedonischen Staaten* (3 vols., 1893–99); *Flavii Josephi Antiquitatum Epitoma* (1906); *Kritik der beiden Makkabäerbücher* (1900); *Grundriss der römischen Geschichte* (3d ed., 1905).

NIESHIN. See NEZHIN.

NIETZSCHE, nēt'she, FRIEDRICH (1844–1900). A German philosophic writer, one of the most daring thinkers and accomplished stylists of the nineteenth century. He was born at Röcken, near Leipzig, son of a Protestant pastor of the village, who died when the precocious boy was five years old. He was brought up by his mother at Naumburg on the Saale, studied at the noted state school at Pforta, and then devoted himself to the study of the classics in the universities of Bonn and Leipzig, meanwhile becoming acquainted with Schopenhauer's writings. At 25, on the recommendation of Ritschl, he became professor extraordinarius of classical philology at Basel, and shortly afterward was promoted to be professor ordinarius there—a post which he was forced to resign in 1879 because of an affection of his eyes. Meanwhile Nietzsche had made the acquaintance of Wagner and become an ardent advocate of Schopenhauer's theories of art. During this period, which was brief and immature, the only work of importance he wrote was *Geburt der Tragödie aus dem Geiste der Musik* (1872), in which he maintained that both Dionysiac (orgiastic) and Apollonic (temperate) motifs contributed to the origination of Attic tragedy. The book might be termed a defense of Wagner's programme. But shortly thereafter came a breach between Nietzsche and Wagner, said to be due to Wagner's compromises with success. With the loss of faith in Wagner he arrived at philosophical independence. The evolution of Nietzsche's thought, which culminated in his idealization of the immoral victor in the struggle for existence, can be traced in his *Menschliches, Allzumenschliches: ein Buch für freie Geister* (1876–80); *Morgenröthe, Gedanken über moralische Vorurtheile* (1881); *Also sprach Zarathustra* (1883–84); *Jenseits von Gut und Böse* (1886); *Zur Genealogie der Moral* (1887); *Der Fall Wagner* (1888); *Götzendämmerung* (1889). Among his other works should be mentioned *Der Wille zur Macht: Versuch einer Umwertung aller Werte* (1896). Of this book the first part is entitled *Der Antichrist,* where the author traces the history of the world, showing the part played by tawny brutes and tawny heroes in the great struggle for power. After Nietzsche left Basel he lived for several years in Turin; in 1889 it became evident that his brain was affected, partly due to hereditary causes and partly to the abuse of soporifics. He retired to his mother's home near Weimar, where he was cared for by his sister until his death.

Nietzsche was a great prose poet, and if we may judge from a volume of his early verse, *Gedichte und Sprüche* (1897), he might have been a great lyrist. Richard Strauss (q.v.) has founded one of his most famous tone poems upon *Also sprach Zarathustra.* Nietzsche's philosophical writings are not systematic, and intentionally offend the Christian reader by their violent denunciation of Christianity, culminating in blasphemy.

Nietzsche's significance in philosophy consists in his resolute attempt to establish an end for life different from the traditionally recognized ends. According to him the task of philosophy is to create values. "*The real philosophers are commanders and lawgivers;* they say: 'Thus *shall* it be!' They determine first the Whither and the Why of mankind, and thereby set aside the previous labor of all philosophical workers and all subjugators of the past; they grasp at the future with a creative hand, and whatever is and was, becomes for them thereby a means, an instrument, and a hammer. Their 'knowing' is *creating*, their creating is a lawgiving, their will to truth is *Will to Power.*" All life is Will to Power. Our present ideals have two sources: the masterful men of the past have contributed to these ideals in living their life in pursuance of ends that their dominating natures set for themselves; but what for them was the expression of their own personality has become for subsequent ages an imitation, a tradition. Against these men the weaker, the mediocre, the sickly, combine under the impulse of their gregariousness, and set up a standard of life which consists in the glorification of the traits which make for the safety of themselves. These traits are considered virtues, and such virtues are the virtues of a slave morality, which is thus the expression of the Will to Power of the inferior. "Those qualities which serve to alleviate the existence of sufferers are brought into prominence and flooded with light; it is here that sympathy, the kind, helping hand, the warm heart, patience, diligence, humility, and friendliness attain to honor; for here these are the most useful qualities, and almost the only means of supporting the burden of existence. Slave morality is essentially the morality of utility. Here is the seat of the origin of the famous antithesis of 'good' and '*evil*':—power and dangerousness are assumed to reside in the evil, a certain dreadfulness, subtlety, and strength, which do not admit of being despised. According to master morality, it is precisely the 'good' man who arouses fear and seeks to arouse it, while the bad man is regarded as the despicable being." In the slave morality good and *evil* are reckoned from the point of view of those *affected* by the action; in master morality good and *bad* are reckoned by the dominant demands of the *doer* of the act. In the master morality the virtues are the excellences which give power to the master; his morality is the morality of the aristocrat, of the noble. But the noble man is not altogether ruthless; indeed he has a love which is the overflow of his own power; but this love is not controlled by law; it goes out freely to those of his kind among whom he recognizes his equals, and it may even reach the inferior where they do not stand in his way. But his love for his equals is always tempered with hardness and fear, his love for his inferiors with contempt. He recognizes no obligation imposed upon him by others: noblesse oblige, but its obligations are not the traditional ones of the current morality. The slave morality with its mediocre virtues is to be maintained and encouraged for the inferior, the ordinary man. It becomes disastrous only when those who are born to be masters allow themselves to be imposed upon by it and thus lose their birthright of independence. But while the mature master is thus free, his freedom is only attained by a stern discipline in childhood and youth, and this discipline is continued by himself in later years; he is hard, not only towards others, but towards himself. He allows himself no passionate outbreaks in small matters; he reserves his strength and the exercise of his strong positive impulses for the crises which come only seldom in his life. At other times he is self-contained, distant, courteous. Nietzsche's nobleman is historically prefigured in the Greek Alcibiades, but is rather an ideal than an historical reality. He is an end to be worked for, and all the arrangements of society should be ordered with a view to make his realization possible. Those who adopt this end will marry with a view to the eventual *superman*—this is what Nietzsche calls his ideal—and thus eugenics is a cardinal principle in Nietzsche's creed, but it seems to be an eugenics for the aristocracy alone. Democracy and Socialism with their insistence upon equality of rights and privileges Nietzsche violently opposes. Religion with its eye on another world is a deadly foe to the breeding of supermen; the true values are of this world. But the superman is after all a "sport," a freak, and does not propagate supermen. Hence the long labor of breeding and providing for supermen finds only a brief and intermittent realization—it is the labor of Sisyphus. If there is to be any permanent significance in the superman, this must come from the eternal recurrence of supermen, each with his own unique value in himself. To make this uniqueness something other than ephemeral, Nietzsche assumes a cyclical character in cosmical history; everything returns in identically the same order, in identically the same detail. The universe is "a circular movement which has already repeated itself an infinite number of times, and which plays its game for all eternity."

Nietzsche's philosophy with its revaluation of all values and its apotheosis of the self-contained man of mastery was taken up even in his own day by those who found in it a license to follow their passions and indulge their ease; he was bitter in his denunciation of these distorters of his philosophy. The superman is no sensualist, no loafer; he knows the isolation in which his greatness places him, and struggles against his hard fate, but in vain. Greatness is thrust upon him by his very nature. Nietzsche is held by many responsible for the war spirit of Germany and its masterful politics and diplomacy. A proper determination of his responsibility would require very subtle distinctions, and the popular verdict is without doubt based on a very superficial understanding of his philosophy.

A complete edition of Nietzsche's works in 19 volumes was published at Leipzig (1896–1913); an English version under the editorship of Oskar Levy has appeared in 18 volumes (Edinburgh, 1910–14). His collected letters were published in three volumes (Berlin, 1902–09).

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1915); also Henri Lichtenberger, *La philosophie de Nietzsche* (4th ed., Paris, 1899); containing a bibliography; G. N. Dolson, *The Philosophy of Friedrich Nietzsche* (New York, 1901), containing a bibliography; Alvis Riehl, *Friedrich Nietzsche, der Kunstler und der Denker* (3d ed., Stuttgart, 1901); Kronenberg, *Nietzsche und seine Herrenmoral* (Munich, 1901); Andrew Seth, *Man's Place in the Cosmos* (2d ed., Edinburgh, 1902); Rudolf Eisler, *Nietzsches Erkenntnistheorie und Metaphysik* (Leipzig, 1902); Adelbert Dueringer, *Nietzsches Philosophie vom Standpunkte des modernen Rechts* (ib., 1906); G. Simmel, *Schopenhauer und Nietzsche* (ib., 1907); J. M. Kennedy, *Quintessence of Nietzsche* (New York, 1910); Borbat, *Nietzsche, tendances et problèmes* (Zurich, 1911); M. A. Mügge, *Friedrich Nietzsche: His Life and Work* (3d ed., London, 1911); A. M. Ludovici, *Nietzsche and Art* (Boston, 1912); George Chatterton-Hill, *The Philosophy of Nietzsche: An Exposition and an Appreciation* (New York, 1913); H. L. Mencken, *The Philosophy of Nietzsche* (3d ed., Boston, 1913), containing a bibliography; Paul Carus, *Nietzsche and the Exponents of Individualism* (Chicago, 1914); George Brandes, *Friedrich Nietzsche,* translated from the Danish by A. G. Chater (New York, 1914); Ernest Barker, *Nietzsche and Treitschke* (Oxford, 1914); J. M. Kennedy, *Nietzsche* (London, 1914); Otto Ernst (pseud.), *Nietzsche der falsche Prophet* (Leipzig, 1914); Daniel Halévy, *Life of Friedrich Nietzsche,* translated by J. M. Hone (London, 1914); also J. G. Huneker, in *Egoists* (New York, 1909); W. F. Barry, in *Heralds of Revolt* (London, 1909); J. G. Huneker, "New English Nietzsche," in *Pathos of Distance* (New York, 1913); P. E. More, in *Shelburne Essays, Eighth Series* (ib., 1913); James Lindsay, "Critical Estimate of Nietzsche's Philosophy," in *Bibliotheca Sacra*, vol. lxxii (Oberlin, 1915); *International Journal of Ethics*, vol. xxv (Concord, N. H., 1915); Laing, "Metaphysics of Neitzsche's Immoralism," in *Philosophical Review*, vol. xxiv, 1915. Dolson's and Mencken's books are the most to be recommended.

NIEUPORT, ne′ōō-pōr′ (Flem. Nieuwpoort). A town in the Province of West Flanders, Belgium, on the Yser River, 10 miles southwest of Ostend (Map: Belgium, A 3). It has a cloth market dating from 1480, an old church, an excellent town hall, and near by is a lighthouse built in the latter part of the thirteenth century. The chief industries are shipbuilding, rope and net making, and fishing. It is also a great bathing resort. It was besieged by the French in 1488–89, and in 1600 Maurice of Nassau defeated the Spaniards under Archduke Albert in the famous Battle of the Dunes. During the European War which broke out in 1914 Nieuport was the scene of extremely heavy and almost continuous fighting. The German drives for Calais met with their greatest resistance on the Nieuport-Dixmude line. Trench warfare and artillery duels, in which first the allies and then the Germans were successful, were almost incessant during the first year of the war. See War in Europe.

NIEUWENHOVE, Armand Marie Guislain, Baron Limnander. See Limnander de Nieuwenhove, A. M. G., Baron.

NIEUWENHUIS, nē′wen-hois, (Ferdinand) Domela (1846–). A Dutch Socialist. Born at Amsterdam, he studied there at the Lutheran Seminary and was a minister at Harlingen (1870–71), Beverwijk (1871–75), and at The Hague (1875–79). He then became a leader of the Social Democrats and practically the founder of the party in Holland. In 1887 he entered the States-General, but he failed of reëlection in 1888. His views became more and more extreme, and he broke from the State Socialists to form with Cornelissen a free Socialist faction. Nieuwenhuis was prominent in the Socialist congresses of Brussels (1891) and of Zurich (1893) as an opponent of Liebknecht and his motion against war and compulsory military service. In 1897, when *Recht voor allen* became the property of the centralization Socialists, Nieuwenhuis started a new journal, *De vrye Socialist.* He published *Schetsen en tafreelen uit de Fransche revolutie van 1789* (1889) and *De geschiedenis van het socialisme* (3 vols., 1901–02).

NIEVO, nē-ā′vō, Ippolito (1832–61). An Italian novelist and poet, born at Padua. He studied in his native town, took part in the revolutionary disturbances of the time, and finally joined Garibaldi. His *Confessioni di un ottuagenario* (1867) holds a high place among the historical novels of the century. He also wrote *Angelo di bontà* (1856), *Il conte pecorajo* (1857), and *Poesie* (1854–56), as well as three collections of tales, containing especially *Il Varmo, Il Barone di Nicastro,* and the uncompleted *Il pescatore di anime.* Nievo's work studies comprehensively the development of the Italian national consciousness from 1775 to 1850. Though at times prolix, it is characterized by brilliancy of wit and much picturesqueness. In point of view it shows the transition from romanticism to realism, of which latter school Nievo may be considered the founder in Italy. Consult D. Mantovani, *Il poeta soldato, Ippolito Nievo* (Milan, 1900), and Croce, "I. Nievo," in *La Critica,* November, 1912 (Bari).

NIÈVRE, nyâ′vr′. A central department of France, nearly conterminous with the former Province of Nivernais. It is named from the river Nièvre, an affluent of the Loire. The Loire and the Allier form its west boundary (Map: France, N., J 5). Area, 2658 square miles. The eastern half is occupied by the forest-covered Morvan Mountains, which form part of the watershed of the Loire and Seine, but in the′ river valleys of the west the land is more fertile. Forest and mineral products, the latter including coal, iron, marble, and millstones, form the chief wealth of the department, but stock raising, agriculture, and viticulture are also important. The chief manufactures are glass and porcelain, and there are large iron and steel works. Pop., 1901, 323,783; 1911, 299,312. Capital, Nevers (q.v).

NIFLHEIM, nĭv′′l-hīm (ONorse, cloud home, OHG. *nibul*, Ger. *nebel*, Lat. *nebula*). One of the nine separate abodes or homes of which the old Scandinavians conceived the world as consisting in the beginning of time. It is the kingdom of cold and darkness and is separated from Muspelheim, the kingdom of light and heat, by a huge chasm (Ginnungagap, yawning gap). It was the place of punishment and was visited by Odin when he went to inquire after the fate of his son Balder, the god of the summer sunlight. Consult Paul, *Nordische Mythologie* (Leipzig, 1903), and R. B. Anderson, *Norse Mythology* (Chicago, 1875; 5th ed., 1889; Norw. trans., Christiania, 1887; Fr., Ger., Ital. trans.).

NIFO, nē′fō, Agostino, or Augustinus Ni-

PHUS (c.1473–c.1538). An Italian scholar. The place of his birth is uncertain. At an early age he settled at Sezza and afterward studied and taught philosophy at Padua, Naples, Rome, Pisa, Bologna, and Salerno. Nifo at first belonged to the school of Averroës (q.v.). His commentaries, several times reprinted, were collected with his *Opuscula Moralia et Politica* in 14 volumes (Paris, 1654). Afterward Nifo modified his beliefs to suit orthodox doctrine and published the writings of Averroës (1495–97), with notes and objections. He was charged by Leo X to answer Pompanazzi's *De Immortalitate Animi*, and for this service he received the title of Count Palatine. His philosophical treatises, *De Immortalite Animi* (1518, 1524), *De Intellectu Libri VI* (1503, 1527, 1592), and *De Infinitate Primi Motoris Quæstio* (1504), are the most important of his productions. He also wrote *De Falsa Diluvii Prognosticatione* (1519) and *De Auguriis Libri Duo* (1531).

NIGEL, nī′jel, known as NIGEL WIREKER (fl. c.1190). A satirist who flourished towards the close of the twelfth century. He was a monk in Christ Church priory, Canterbury, and was personally acquainted with Thomas à Becket. His famous work is *Speculum Stultorum* (A Mirror of Fools), a satire in Latin elegiac verse on the clergy and society in general. The hero is Burnellus, or Brunellus, an ass, who wants a longer tail. The poem was immensely popular for centuries. Under the title "Daun Burnel the Asse" it is quoted by Chaucer in the "Nun's Priest's Tale." Nigel also wrote several short Latin poems and a prose treatise, *Contra Curiales et Officiales Clericos.* Consult Wright, *The Anglo-Latin Satirical Poets* (London, 1874), and Ward, *Catalogue of Romances* (ib., 1883–93).

NIGEL′LA (Neo-Lat., fem. of Lat. *nigellus*, blackish, dim. of *niger*, black). A genus of annual plants of the family Ranunculaceæ, indigenous to the Mediterranean region and the warmer temperate parts of Asia, having five colored spreading sepals, five or ten small two-lipped petals, with tubular claws, leaves divided into threadlike segments, and flowers solitary at the top of the stem or branches. *Nigella damascena*, occasionally seen in gardens, is known by the names fennel flower, devil-in-the-bush, and love-in-a-mist. This species is sometimes cultivated and is occasionally found growing wild in the United States. The somewhat peppery aromatic seeds have been used as a substitute for spices. Those of *Nigella sativa*, nutmeg flower, a species common in grain fields in the south of Europe, are supposed to be the black cummin of the ancients and perhaps the cummin of the Bible. The seeds of a species of *Nigella* are much used by the Afghans in curries.

NIGER, nī′jẽr, MILITARY TERRITORY OF THE. An administrative subdivision of the Government General of French West Africa, detached from the Colony of Upper Senegal and Niger by Decree of Sept. 7, 1911 (effective Jan. 1, 1912). The territory lies directly north of the British Protectorate of Nigeria, its southern limit touching the Niger River on the west and Lake Chad on the east; northward it extends to the ill-defined limits of the Algerian and Tripolitan Sahara. On the southwest it is separated by the Niger from Dahomey and Upper Senegal and Niger, the latter colony marking the remainder of its western boundary; on the east are the northern reaches of French Equatorial Africa (Kanem, Tibesti, etc). The estimated area of the territory was formerly stated at 1,383,700 square kilometers, but the 1914 *Annuaire du gouvernement général de l'Afrique occidentale française* states it at about 900,000 square kilometers. There are two distinct regions: at the south, extending from the Niger to Lake Chad, with an average width of 150 kilometers, is the region of plains and savannas, producing millet, rice, wheat, earthnuts, tobacco, cotton, and indigo and affording pasturage for camels, horned cattle, and sheep; north of this belt is the desert. There is no railway. In 1912 imports were valued at 890,000 francs (cotton goods 575,000, cola nuts 78,000, sugar 32,000) and exports at 852,000 francs (live animals 320,000, salt 162,000, millet 78,000). The population is estimated at 850,000, of whom about 715,000 are Mohammedans and 115,000 fetishists. The ethnical groups, which are numerous, may be divided into three classes: the Tuaregs and Tubus, the Peulhs, and the Sudanese peoples. The Tuaregs inhabit the north; they are nomad camel raisers, turbulent, and given to pillage. The Tubus, also nomads and audacious pillagers, are found in the northeast, their proper haunts being Tibesti and Borku. The Peulhs, who number probably only about 35,000, live especially in the Jerma country (near the Niger) and in Demagherim (south of Zinder); they are nomads and grazers. The great majority of the inhabitants are sedentary Sudanese negroes, of whom the Jermas and the Hausas are the most important and by whom the agricultural interests of the territory are chiefly maintained. The Jermas, who number about 250,000, dwell in the southwest, in the Dosso and Niamey country. For an account of the intelligent and industrious Hausas, see HAUSA STATES. The Hausas, about 265,000 in number, live especially in the region around Zinder. This town, which is 220 kilometers north-northeast of the famous city of Kano in Nigeria, is the seat of government. Other towns in the territory are Tillabery, Niamey, Kirtachi, Dosso, Gaya, Dogonduchi, Madawa, Maradi, Tessawa, Dajiduna, Agades, Bultum, Gure, N'Guigmi, Agadem, and Bilma. The territory is administered by a military officer bearing the title Commissioner of the Government General and having nearly the same powers as the lieutenant governor of the French West African colonies.

NIGER, or JOL′IBA. The third largest river of Africa (Map: Africa, E 3). It has no single native name. It is generally known, however, as the Joliba in the upper course, the Issa and Mayo in the middle, and the Kwara (Quorra) in the lower course. The Niger rises on the inner frontiers of Sierra Leone and Liberia, about 150 miles only from the sea, and flows first northeastward to Timbuktu; thence eastward along the escarpment of the Sahara plateau; finally it turns to the southeast, which direction it maintains, with a few deviations, to its mouth. It enters the Gulf of Guinea through a vast delta extending 100 miles inland and occupying an area of 14,000 square miles. The delta consists almost wholly of low and malarious mangrove swamps, and its size is increasing rapidly, owing to the constant inland breezes which prevent the sediment from being carried to sea. Only one of the numerous arms of the delta, the Nun, is accessible to seagoing vessels. The length of the Niger is about 2600 miles, and the incline of its bed through its whole course is very gentle, with few rapids, in which respect the Niger differs conspicuously from other African rivers. By means of the Benue (q.v.), its largest tributary, which flows into it some distance below Rabba, it is the only river in Africa which affords an entrance into the interior free from rapids. It is, however, navigable only in sections, being obstructed at several places. At Bamaku, 250 miles from its source, it is already 500 yards wide, and from here it is navigable for small steamers to Timbuktu, above which place it spreads out into a large inland delta converging in the marshy Lake Debo. Below Timbuktu it runs through a rocky gorge, where it is narrowed to a width of 300 feet and obstructed by rapids. The greater part of its middle course lies in a desert region, where it receives scarcely any tributaries, and where vegetation flourishes only immediately along its banks. As it flows southward, however, the country becomes more and more fertile and populous. The head of permanent steam navigation is at Rabba, 460 miles from the mouth of the river, which below that point is a broad and tranquil stream 50 feet deep in the dry season and over 100 feet deep during floods.

The chief towns or settlements on the river are, in descending order, Bamaku, Sego-Sikaro, Sansanding, Gundam, Timbuktu, Gogo, Birni, Say, Busah, Rabba, Lakoja, and places situated in the delta.

The name Niger (*Nigris*) is mentioned by ancient writers, but did not probably refer to this river. The stream was first made known to Arabian geographers in the Middle Ages by travelers across the Sahara, but it was then believed to communicate with the Nile. It had not been seen by Europeans until Mungo Park explored its upper course in 1796. The lower course was first explored by Clapperton, Denham, and Lander in 1825–32.

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NIGE'RIA, or NIGER TERRITORIES. A British colonial possession in Africa, organized in 1900 as the two protectorates of Northern and Southern Nigeria, which with their territories were amalgamated on Jan. 1, 1914, to form the Colony and Protectorate of Nigeria. It occupies the territory which lies between the military territories of French Sudan, Lake Chad, Kamerun (q.v.), the Gulf of Guinea, and the French possession of Dahomey (Map: Africa, E 4). Northern Nigeria comprised a large portion of the Fulah or Sokoto Empire, with its subordinate states of Hausa, Nupe, Ilorin, Muri, Gandu, Kano, Katsena, Banchi, a portion of Adamawa, Bakundi, Donga, Takum, and Zaria, besides part of the Kingdom of Bornu, and of the pagan confederation of Borgu. Southern Nigeria consisted of what was once known as the Niger Coast Protectorate, supplemented by considerable acquisitions along the Cross River in the southeast and Lagos. The area of Nigeria is 335,580 square miles, and the census of 1911 gave it a population of 17,124,016.

The physical features of the region are as yet slightly known. The country along the gulf is, as far as 40 miles inland, swampy and intersected by the numerous arms of the Niger and a multitude of other streams interlacing each other and lined with mangrove trees. The climate of that district is characterized by humidity and unhealthfulness. The portion north of the coast region, as far as the confluence of the Benue with the Niger, is an undulating forest country, while that north of the Niger is mostly hilly and partly covered with thin forests. The extreme north partakes of the character of the Sahara.

Southern Nigeria is an agricultural country; it also has valuable forest products, notably palm kernels and oil, mahogany, and rubber. There are good crops of cotton, cacao, corn, yams, cassava, ground nuts, etc. The palm products come largely from the unhealthful region of the Niger delta. Northern Nigeria produces rubber, hides, chilies, ground nuts, ivory, various drugs, etc. Tin mining is carried on, especially in the Bauchi district; considerable areas of alluvial deposits of cassiterite have been discovered in this region. Lignite is found near Asaba. The imports and exports of Southern Nigeria in 1911 were valued at £5,234,186 and £5,354,101 respectively; in 1912, £6,430,601 and £6,089,706; in 1913, £7,202,000 and £7,352,000. The leading exports in 1912 were valued as follows: palm kernels, £2,797,411; palm oil, £1,654,933; cacao, £130,542; rubber, £125,022; cotton, £102,931; mahogany, £78,006. About three-fourths of the imports are from, and nearly one-half of the exports are to, the United Kingdom. Tonnage entered and cleared in 1911, 1,610,668; in 1912, 1,656,913; in 1913, 1,738,459. Imports into Northern Nigeria, in 1911, £886,483; exports, £830,268.

The principal port is Lagos (q.v.); other ports are Warri, Sapele, Burutu, Akassa, Forcados, Degema, Brass, Opobo, Bonny, and Calabar. At Lagos the bar has been dredged and improvements made enabling large seagoing steamers to enter the harbor. There is inland navigation on the Niger, the Cross, the Benue, and other waterways. In 1901 a government railway (the Lagos Railway) was opened between Iddo Island (between Lagos Island and the mainland) to Ibadan, 123 miles distant. Subsequently the line was extended 183 miles to Jebba, on the Niger, in Northern Nigeria, and thence northeast, passing Zungeru, about 145 miles to Minna. Here the line joins the railway built by the Northern Nigeria government from Baro, on the Niger, northeast to the old city of Kano, 356 miles. The first train entered Kano in March, 1911. In 1911–12 a light railway was constructed from Zaria to Rahama, 88 miles; and in 1914 the building of a railway was begun, to extend from the Bonny estuary to the Baro-Kano line at Kaduna.

The revenue of Southern Nigeria increased from £1,459,554 in 1907 to £2,235,412 in 1912, and the expenditure from £1,217,337 to £2,110,498. In 1911–12 the revenue of Northern Nigeria was £962,291 (of which the local revenue was £545,291), expenditure £827,939.

The inhabitants of the coast region are pure negroes and fetishists. The inhabitants of the interior are intermixed with some of the races of northern Africa. They show some traces of Moorish influence. The religion in Northern

Nigeria is Mohammedanism tinged with fetishism. The most advanced of the population are the Hausas. (See Hausa States.) In Northern Nigeria there are numerous Mohammedan schools; in Southern Nigeria there are about 150 government or assisted schools, with over 20,000 pupils enrolled.

British settlements and trading stations were established along the Gulf of Guinea in the region of the Niger at a very early period, but these were only private enterprises without any political powers or aims. Lagos was ceded to the British in 1861. With the establishment of the United African Company, reorganized into the National African Company by Sir George Goldie in 1882, the movement looking towards the future acquisition of Nigeria as a whole by Great Britain was started. After having concluded political treaties with the native rulers the company obtained a royal charter in 1886, and its name was changed to the Royal Niger Company. The boundaries were fixed by treaties with Germany in 1885, 1886, and 1893 and with France in 1889, 1890, 1898, and 1904.

In 1884 and 1887 the territory of Nigeria was declared a British protectorate, and the seaboard region was organized into the Oil Rivers Protectorate and was put under the authority of a royal commissioner in 1891, the company having no jurisdiction in that part of the country. The name of the Oil Rivers Protectorate was changed in 1893 to Niger Coast Protectorate; its territory was augmented by the addition of the Kingdom of Benin in 1897 and further extensions along the Cross River in the southeast. At the beginning of 1900 the company surrendered its charter, and the name of the Niger Coast Protectorate, with boundaries extended westward to the Protectorate of Lagos, was changed to Protectorate of Southern Nigeria. In February, 1906, Southern Nigeria was amalgamated with the Colony and Protectorate of Lagos; Lagos became the Lagos, or Western, Province, and the remainder of the territory consisted of the Central Province and the Eastern Province; and the dependency as a whole received the style Colony and Protectorate of Southern Nigeria. The city of Lagos became the capital.

The administration of Northern Nigeria was taken over by the British government from the Royal Niger Company at the beginning of 1900, when the Protectorate of Northern Nigeria, divided into 13 provinces, was constituted and a governor appointed. The seat of government, established first at Jebba, was removed to Zungeru in September, 1900. The slave trade, formerly active in Northern Nigeria, was prohibited by the British in 1900, all children born from that date being declared free; many slaves are liberated each year; and the native rulers have assisted in abolishing the sale and transfer of slaves. By orders in council which came into operation Jan. 1, 1914, the Protectorate of Northern Nigeria and the Colony and Protectorate of Southern Nigeria were formed into the Colony and Protectorate of Nigeria, with a governor and an executive council for Nigeria as a whole and with a legislative council for the colony. The colony is under an administrator, and the protectorate, divided into northern and southern groups of provinces, is under two lieutenant governors. The seat of government is Lagos, pending the selection of a site on the river Kaduna.

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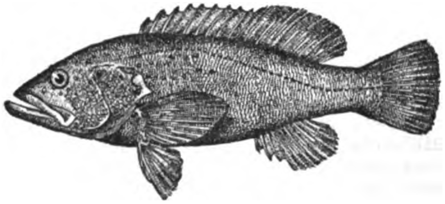
NIGGER CHUB, or Nigger Dick. A chub (*Exoglossum maxillingua*) of the lakes and rivers of the Middle States, distinguishable from all other cyprinids by its three-lobed underjaw. It is about 6 inches long, dusky greenish on the back, with a black bar behind the gill cover. Cf. Cutlips (a name also locally given to the present fish).

NIGGERFISH. One of the many names given to the sea bass of the genus *Bodianus*, allied to the groupers. They are small, bright-colored spotted fishes that live in warm seas. A common species about Bermuda, Florida, and southward is *Bodianus fulvus*, also called yellow-fish and butterfish, a dark variety of which is especially designated by niggerfish. The Spanish name for the group is guativere. They are brought to market.



NIGGERFISH (*Bodianus fulvus*).

NIGGERTOES. See Brazil Nuts.

NIGHT APE. A nyctipithecine monkey. See Douroucouli.

NIGHT BLINDNESS, or **NYCTALOPIA.** See Sight, Defects of.

NIGHT-BLOOMING CEREUS. See Cereus.

NIGHT BLUE. See Coal-Tar Colors.

NIGHTHAWK. The North American nightjar (*Chordeiles virginianus*), numerous and well known in all temperate parts of the continent in summer, whence in winter it migrates to the tropics. It is about 10 inches long and 23 inches in expanse of wing. The gape is destitute of bristles. The tail is slightly forked. The general color is brown, much mottled, and marked with white. There is a white mark on the throat, in shape like the letter V, and a broad white bar, which extends across the first five primary wing feathers, is plainly visible when the bird is near by and flying. The middle toe is provided with a comblike process, perhaps used by the bird to free itself of vermin. The nighthawk is seen pursuing its insect prey in the air, chiefly after sunset and before dawn, and attracts attention by its sharp, tearing cry. It also produces in its flight a remarkable hollow booming sound, "like blowing into the bunghole of a barrel," in the moments of its perpendicular descent through the air, which has gained for it such rustic names as bullbat and piramidig; also mosquito hawk. Its movements in the air are extremely beautiful and rapid. When fat and plump, as it usually is on its southward migration, it is said to be good eating and some are shot for that purpose. The North American species is divided into five geographic subspecies. A closely allied species (*Chordeiles acutipennis*) occurs in Texas and Mexico and another in the West Indies. The latter is very generally known as the gie-me-a-bit, from its very characteristic note. Nighthawks lay their eggs on the bare ground or on a flat rock or roof of a building. They are usually two in number and are dull white, closely marked with fine specks of grayish brown. At rest these birds roost by squatting lengthwise on a large horizontal tree branch and at once become nearly invisible. Cf. Whippoorwill. See Plates of Nightjar, Guacharo, etc.; and of Eggs of Song Birds.

NIGHT HERON. A heron of the genera *Nycticorax* or *Nyctanassa*, intermediate in form between bitterns and herons, but with shorter and thicker bill than either and legs shorter than in herons. The common night heron or qua-bird (*Nycticorax nycticorax*) is found throughout all warm temperate regions. The American bird, a subspecies to which the name *nævius* is given, is abundant in America and is partly a bird of passage. Its length is fully 2 feet. Its plumage is soft, the general color ash gray, passing into black on the neck and head and into white on the breast and belly; the back of the head is adorned with three very long white feathers, which hang down on the neck. The young are very different—grayish brown marked with white above and white streaked with blackish underneath. The nests are built in trees and usually many together, forming a heronry; the eggs are four to six in number, of a dull blue. (See Plate of Eggs of Water and Game Birds.) The night heron feeds chiefly by twilight or at night and is never seen standing motionless like other herons, but walks about in search of prey by the sides of ditches and ponds, as its food consists chiefly of fishes, frogs, and other aquatic animals. Its cry is very loud and hoarse. Another species (*Nyctanassa violacea*) is found in the southern United States. Its crown is white washed with buff, and it is therefore called the yellow-crowned night heron. It is more solitary than the common species, appearing singly or in pairs, and is also less nocturnal. Other species of night heron are found in Africa and Australia. The crabier of Jamaica belongs to these herons.

NIGHT'INGALE (AS. *nihtegale*, OHG. *nahtagala*, Ger. *Nachtigall*, from AS. *niht*, night + *galan*, to sing). A justly celebrated migratory song bird of western and central Europe, which is a warbler, closely related to the robin redbreast, and as large as a thrush—the *Daulias luscinia*, or more correctly *Luscinia megarhyncha*, of modern ornithologists. It is rich brown in color, the rump and tail reddish, the lower parts grayish white. The sexes are alike. It is plentiful in some parts of the south and east of England, but does not extend to the western counties and never appears in Ireland. It frequents thickets and hedges, and low damp meadows near streams. It arrives in England about the middle of April, the males 10 to 14 days before the females. It is at this season, and before pairing has taken place, that birdcatchers generally procure nightingales for cage birds, as they then become easily reconciled to confinement, while, if taken after pairing, they fret and pine till they die. The nightingale makes its nest generally on the ground, but sometimes on a low fork of a bush. The nest is loosely constructed of dead leaves, rushes, and stalks of grass, with a lining of fibrous roots. The eggs are four or five in number, of a uniform olive brown. The song of the male ceases to be heard as soon as incubation is over, and Newton remarks that it is not safe for novelists to represent it as singing before April 15 or after June 15. In captivity, however, it is often continuous throughout the year, especially in roomy aviaries. The nightingale usually begins its song in the evening and sings with brief intervals throughout the night. The variety, loudness, and richness of its notes are equally extraordinary, and its long quivering strains are full of plaintiveness as well as of passionate ecstasy. The nightingale has been a favorite from the most ancient times and is often mentioned in the poetry of India and Persia, as well as of Greece and Rome; but the bird referred to by these Eastern writers is in most cases a larger species (*Luscinia luscinia*), the philomel, sprosser, or thrush nightingale, which is never seen west of the Rhine, or else a third species (*Luscinia hafizi*) of Persia and Turkestan. The bird also has a place in classic mythology in the story of Procne and Philomela. Consult: Burroughs, *Winter Sunshine* (Boston, 1876; autograph ed., ib., 1904); Alfred Newton, *Dictionary of Birds* (London, 1893–96); Kirkman (ed.) and many authors of *The British Bird Book* (ib., 1911). See Colored Plate of Song Birds with Thrush.

NIGHT'INGALE, Florence (1820–1910). An English hospital superintendent and reformer of nursing, born at Florence, Italy, May 15, 1820, the daughter of William Edward Nightingale, of Embley Park, Hampshire. Most of her childhood was spent in Staffordshire. Under the influence of her mother, a philanthropic woman, Miss Nightingale's attention was directed early to the condition of hospitals; she traveled extensively on the Continent to study such institutions and entered upon a course of training in nursing with the Sisters of St. Vincent de Paul in Paris and at the Institute of Protestant Deaconesses at Kaiserswerth on the Rhine. Her experience led her to plan to elevate nursing into a permanent and honorable occupation for women. In 1853 she became superintendent of a hospital for governesses in London. Upon the outbreak of the Crimean War in 1854 she set out for the front with 38 nurses. Nursing departments were organized by her at Scutari and later at Balaklava. By untiring energy and extraordinary ability in the face of almost incredible difficulties Miss Nightingale succeeded in alleviating the suffering of the sick and wounded. After the close of the war she gave a testimonial fund, which in 1860 amounted to £50,000, to the founding of the Nightingale Home at St. Thomas's Hospital for the training of nurses. During the Indian Mutiny, the American Civil War, and the Franco-Prussian War she was often consulted on questions concerning camp hospitals. She was an authority not only on military hospitals and nursing, but on nursing and sanitation in civil hospitals and in the home. Miss Nightingale received many honors from various governments and was the first woman upon whom the Order of Merit was conferred (1907). In 1915 a new statuary group for the Crimean Memorial, Waterloo Place, London, was unveiled. One of the figures is that of Florence Nightingale—"The Lady with the Lamp." Except for monuments to royal ladies, it was the first public statue of a woman in London. Miss Nightingale died in London, Aug. 13, 1910. She wrote: *Notes on Hospitals* (1859; 3d ed., 1863); *Notes on Nursing* (1860); *Life or Death in India* (1874); *Notes on Nursing for the Laboring Classes* (1876); *Health Teaching in Towns and Villages* (1894). *Florence Nightingale to her Nurses: Selections from her Addresses* appeared in 1914 (New York).

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NIGHT'JAR'. A general term, derived from their nocturnal habits and jarring utterances on the wing, for the large family Caprimulgidæ (i.e., goatsuckers), which is nearly cosmopolitan in extent. Nightjars are birds varying in size from 8 to 15 inches in length; all have light soft plumage, in finely mottled shades of gray, brown, and white; and they bear many resemblances to owls in structure as well as in their nocturnal and crepuscular habits. In some particulars they resemble the swifts, and, like them, capture all their food upon the wing; and, as moths form a conspicuous part of this, the tribe has been called moth hunters. In pursuit of this prey they are often seen in the dusk about pastures with the cows or (in southern Europe) with the goats; and their habit of dodging about the cattle after insects, together with their capacious mouths, led to strange superstitions which are entirely without foundation. The wings are long and powerful, and in the males of some species are furnished with long ornamental feathers (see STANDARD-WING); while in others some tail feathers are lengthened. The legs and feet are small and weak, and the middle toe is usually remarkably long, and serrated on its inner edge, so as to form a kind of comb attached to the toe. Although the bill is very short and weak, the gape is extremely wide, as if the head itself were divided, and the mouth is surrounded by bristles, assisting the bird in securing its agile prey. All avoid activity in daylight, when they rest quietly on the ground, a log, stone, or large horizontal tree branch, in some shady place, and almost always lengthwise of the perch—a habit due not only to the feeble grasping power of the feet, but to the greater invisibility thus obtained. In many instances the birds have a further protective habit of stiffening themselves in certain positions where they resemble a knot or a broken and projecting stick, and so escape notice. (See MOREPORK.) They make no nests, or only very poor ones, which are placed on the ground. The oblong eggs are usually two, and are whitish or inconspicuously marked. (See Colored Plate of EGGS OF SONG BIRDS.) The voice is a screaming, jarring, or booming note, produced in flight; while many species have an oft-repeated cry, usually translatable into syllables, as "whip-poor-will" or "'chuck-will's-widow." About 100 species are known, included in about 14 genera. Of these, four or five genera with six species occur in the United States. The best known are the whippoorwill, chuck-will's-widow, poorwill, and nighthawk (qq.v.). The best-known species of the Old World is the common nightjar, churn-owl, or fern owl (*Caprimulgus europæus*), familiar throughout central Europe, the Mediterranean region, and western Asia. The potoos (q.v.) of Jamaica and South America represent a distinct subfamily (Nyctibiinæ), and an aberrant form is the guacharo (q.v.).

Consult standard authorities, especially Alfred Newton, *Dictionary of Birds* (London, 1893–96). See Plate of NIGHTJARS, ETC.

NIGHT'MARE' (*night* + *mare*, AS. *mara*, OHG. *marō*, *mar*, dialectic Ger. *Mahr*, *Mar*, incubus; connected with Polish *mora*, Boh. *mura*, incubus, Russ. *kiki-mora*, ghost). A sensation of distress, suffocation, or oppression which occurs during sleep and is attended by hideous dreams or indefinite feelings of terror, with a sense of utter helplessness and inability to move or cry out. Nightmare is associated with disturbances of the circulation and respiration; it is commonly caused by the taking of heavy meals or indigestible food shortly before going to bed. It occurs in persons of a nervous temperament, or in those subjected to severe mental strain or overwork. The physical symptoms of nightmare include groaning, flushing of the face, neck and chest, cold perspiration, or a general trembling of the body. The breathing is disturbed and sometimes stertorous. The pulse is irregular, but otherwise normal.

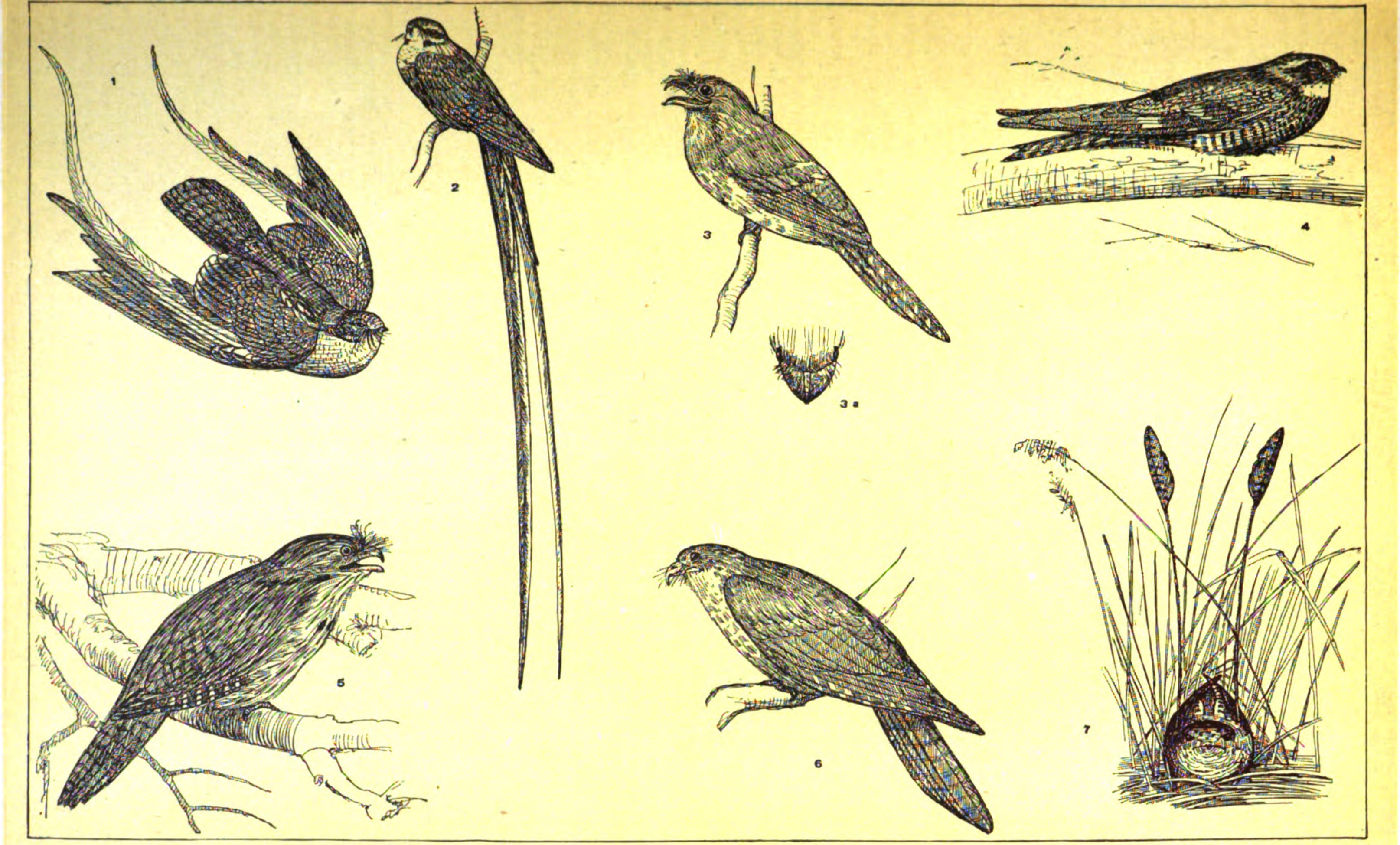
The *night terrors* of children may be regarded as a form of nightmare. The child sees some object which inspires him with fear, and springs up, screaming and protesting. He recognizes no one and has no remembrance of the circumstance in the morning. Night terrors may be associated with indigestion, an overfilled bladder, enlarged tonsils and adenoids, worms, incipient hip disease, and delayed dentition. The telling of ghost stories or other tales of horror to older children who are of a nervous, imaginative temperament is often a cause of nightmare. Other allied psychic conditions are observed in certain forms of incipient delirium, such as occurs in fevers, or as the result of alcoholic excesses. See DELIRIUM.

NIGHTMARE ABBEY. A novel by Thomas Love Peacock (1818). The hero is a caricature of Shelley.

NIGHT PARROT. See KAKAPO.

NIGHT'SHADE' (AS. *nihtscada*, OHG. *nahtscato*, Ger. *Nachtschatten*, nightshade, from AS. *niht*, OHG. *naht*, Ger. *Nacht*, night + AS. *scada*, OHG. *scato*, Ger. *Schatten*, shade). The common name of certain plants of the family Solanaceæ, possessing the narcotic properties frequently developed in that order. Among them are some species of Solanum, particularly the common nightshade or black nightshade (*Solanum nigrum*), an annual or biennial

NIGHTJARS, GUACHARO, ETC.



1. STANDARD-WINGED NIGHTJAR (Cosmetornis vexillarius).
2. BRAZILIAN FORK-TAILED NIGHTJAR (Hydropsalis furcifera).
3. MALACCAN FROGMOUTH (Batrachostomus stellatus).
3a. BEAK OF FROGMOUTH from above.
4. AMERICAN NIGHTHAWK (Chordeiles Virginianus).
5. MOREPORK (Podargus Cuvieri).
6. OIL-BIRD, or GUACHARO (Steatornis Caripensis).
7. PENNANT-WINGED NIGHTJAR (Macrodipteryx macrodipterus).

slightly narcotic weed in waste places throughout the world. It has erect angular stems, ovate leaves, drooping lateral umbels of white flowers, and globose black berries. The leaves in a fresh state are said to be injurious to animals, but seem to lose almost all narcotic property by boiling. The berries, although generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger, and some forms are grown under the name garden huckleberry or wonderberry. The plants contain the alkaloid solanin, found also in the shoots of the potato. *Solanum dulcamara* is popularly known as bittersweet (q.v.). See Belladonna, and Colored Plate of Poisonous Plants.

BLACK NIGHTSHADE.

NIGHTSHADE FAMILY. A family of plants. See Solanaceæ.

NIGHT SWEATS. A medical term, designating profuse sweating during the night, occurring in chronic wasting diseases, especially in pulmonary tuberculosis, when it is an important subjective symptom for the patient. See Tuberculosis.

NIGHT TERRORS. See Nightmare.

NIGHT THOUGHTS. See Complaint, The.

NIGHT WALKER, The, or The Little Thief. A comedy by Fletcher. It was written probably not later than 1618, altered by Shirley in 1633, and performed in 1634.

NIGHTWALKING. See Somnambulism.

NIGHT WATCH, The. A large picture in the Rijks-Museum at Amsterdam by Rembrandt (q.v.).

NIGID'IUS FIG'ULUS, Publius (c.100–44 b.c.). A Latin grammarian and Pythagorean philosopher. He was pronounced by Aulus Gellius the most learned of the Romans next to Varro, and was so celebrated as an astrologer that in later times it was believed he had predicted the future greatness of Octavianus on learning of the latter's birth. He was a partisan of Pompey in the Civil War, and in consequence was compelled by Cæsar to live abroad, and died in exile. The surviving fragments of his works, which treated grammar, religion, and the natural sciences, are printed in the *Variæ Lectiones* (1618, iii, 16) of Rutgersius. Consult: Breysig, *De Nigidii Figuli Fragmentis* (Berlin, 1854); Klein, *De Vita Nigidii* (Bonn, 1861); Röhrig, *De Nigidio Figulo* (Coburg, 1887); Swoboda, *P. Nigidii Figuli Operum Reliquiæ* (Vienna, 1889); Martin Schanz, *Geschichte der römischen Litteratur*, vol. i, part ii (3d ed., Munich, 1909).

NIGRA, nē'grȧ, Costantino, Count (1828–1907). An Italian diplomatist, born at Villa Castelnuova, Turin. He interrupted his studies at Turin to take part in the war against Austria (1848–49), and then entered the diplomatic service and became secretary to Cavour. After the Peace of Villafranca (1859) he was sent to France as Minister Plenipotentiary (later Ambassador). He took an active part in the negotiation of the Treaty of Zurich in 1859 and the cession of Savoy and Nice to France. After the fall of the Empire he remained as Minister in Paris, subsequently becoming Ambassador at St. Petersburg (1876), London (1882), and Vienna (1885). In 1890 he was appointed Senator of the Kingdom, in 1899 he served as the Italian representative at the first Hague Peace Conference, and in 1904 he retired.

NIGRITIA, nė-grĭsh'ē-ȧ. Another name for the Sudan.

NIGROSINE, nī'grō-sĭn. See Coal-Tar Colors.

NIGUA, nē'gwȧ. See Chigoe.

NIHILISM, nī'hĭ-lĭz'm (from Lat. *nihil*, *nil*, nothing, from *ne*, not + *hilum*, trifle, little thing). A term applied to the tenets of the revolutionary wing of the Russian Liberal party. The term was first used in a novel by Ivan Turgenev, *Fathers and Sons*. Originally it was a school of philosophic and ethical individualism which held aloof from political agitation. In the common mind Nihilism is associated with assassination and revolution, since Russian Nihilists seek to overthrow the present government by force. The movement which resulted in the formation of the Nihilistic party began early in the nineteenth century. As early as 1818 those who aspired for greater freedom in Russia formed an association to further the common welfare. On Dec. 26 (old style, 14), 1825, occurred the celebrated rising of the Decembrists among the officers and soldiers of the army, which aimed at the emancipation of the serfs and the introduction of constitutional government. The revolt was easily quelled, and six leaders were executed; 125 others were imprisoned or exiled. Towards the middle of the century liberal ideas received an impetus from the study of Socialistic writers of other countries. On April 23, 1849, some 33 men were arrested who belonged to an association formed by Petrashevsky, an official of the Foreign Office. These were sentenced to death, but the sentences were commuted to imprisonment and banishment. There were no further disturbances during the reign of Nicholas I.

In 1857 Alexander Hertzen founded in London his journal, the *Kolokol* (Tocsin), which had enormous influence upon the Russian youth. About this time there arose in Russia itself a literary movement, under the leadership of Tchernishevsky, which criticized existing society and sought to arouse the people. Tchernishevsky's paper was suppressed in 1862, but later he wrote a novel, *What is to be Done?* which had great influence in popularizing revolutionary ideas. Shapoff, writing from the historical point of view, urged the introduction of self-government and local autonomy. Organizations sprang up in the universities, and new regulations introduced by the government increased the opposition of the students. The secret associations of St. Petersburg united in 1863 under the name Land and Freedom.

During the decade from 1860 to 1870 true Nihilism was first developed. Its fundamental principle was absolute individualism, the negation of duties imposed by family, state, and religion. An active materialistic propaganda was maintained. It stood for the rights of women and children, demanding equality of treatment for women, and in this respect it won a decided victory. But this individualism was confronted with misery among the common people which was not removed by the emancipation of the serfs. Economic conditions forced a change of policy and the development of political agitation. In 1868 Bakunin (q.v.) started a paper at Geneva, and became the leader of the anarchists, who gained control of the movement. Bakunin advocated the total abolition of the state and substitution of small communes. The mir, or village commune (q.v.), had only to be freed from the state to make an ideal basis. The Russian students, forbidden in 1873 to study at Zurich, returned home to take active part in the propaganda. Associations sprang up throughout the land. Many of the aristocrats took part in this movement. The attention of the government was of course attracted, and in 1873 and 1874 some 1500 persons were arrested. Most of these were released after a few months' imprisonment; the rest were confined for three or four years, and, in 1877, 193 were banished to Siberia. During this same period, and indeed at all times, there existed a more moderate party; but it did not satisfy the demands of the young men and women, particularly of the universities, which have been a hotbed of political agitation. About 1875 the Narodniki became a prominent and widespread organization. It was under the leadership of the society at St. Petersburg. The government now became active, and during 1876 and 1877 the prisons were filled with propagandists. The trials of 1877 and 1878 mark the end of the first period of revolution. The number of persons involved in these trials was about 3800.

The attempts to organize the people into revolt now ended. The cruelty of the government led to reprisals, and the Nihilism which began peacefully in the seventies took on another nature. At first spies of the government were murdered. Feb. 5, 1878, Vera Zassulitch, a young woman of 28, shot at General Trepoff, who had caused a prisoner to be whipped for refusing to take off his hat to him. She was tried before a jury of educated men, eight of whom held government positions, and, to the general surprise, she was acquitted. The government was enraged at this, and the verdict was annulled. Aug. 4, 1878, General Mezentseff was killed in the streets of St. Petersburg. On Feb. 21, 1879, the Governor of Kharkov, Prince Kropotkin, was assassinated, and other attempts were made to assassinate hated officials. April 14, 1879, an attempt to assassinate the Emperor, Alexander II, was made by Solovieff, who was captured and hanged. Two later attempts were likewise failures, but the next (March 13, 1881) was successful. (See ALEXANDER II.) It was hoped that the terror inspired by the death of the Emperor would lead to the introduction of a constitutional system. When this hope failed, constructive measures were sought. In 1880 two reform parties were prominent; one of them had as its mouthpiece the *Tcherny Perediel*, which found its chief support in the workingmen and proposed to educate and organize society in order that social revolution might be effected. The second and more important party was the Narodnaia Volia (Will of the People), which sought to overthrow despotism by the communistic instincts of the peasants. It set forth a programme with the following demands: (1) a representative assembly having supreme control in all state matters; (2) provincial self-government with elective officers; (3) village communes, which were to be economically and executively independent; (4) freedom of conscience, press, speech, association, and political agitation; (5) manhood suffrage; (6) militia instead of a standing army; (7) nationalization of land; (8) measures to socialize factories, etc. The Narodnaia practically dissolved in 1884. With its downfall there came a period of quiet in the social movement, although in the cities there still exists a reform movement among the workingmen. See COMMUNISM; SOCIALISM.

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NIHON, nē′hŏn′. See JAPAN.

NIHONGI, nē′hôn-gē′ (Jap., Chronicles of Japan). An ancient Japanese historical book. In 712 A.D. the *Kojiki* (Records of Ancient Matters), the first book written in Japan, appeared. It was followed in 720 by the *Nihongi*, which gives the substance of the *Kojiki* in Chinese form. Not only are Chinese phrases and sentences employed, but it is fashioned throughout on the model of Chinese histories. It transforms, e.g., the two gods from whom sprang the Japanese race into the positive and negative principles of the Chinese philosophy, and it puts into the mouths of mythical Japanese monarchs speeches filled with quotations from the Chinese classics. It omits a few legends, explains away the grossness of a few others, and gives variant versions of still others. It adds also 72 years of history. In Japan it has far excelled the *Kojiki* in popularity, but to the serious student it is of much less value, though it is still a secondary source for the history of ancient Japan.

NIIGATA, nē′ē-gä′tȧ. A seaport on the west coast of Hondo, Japan, and capital of a prefecture, at the mouth of the Shinano River, in lat. 37° 55′ N. and long. 139° 3′ E. (Map: Japan, F 5). By the Treaty of 1858 Niigata was opened to foreign commerce on Jan. 1, 1869, but the existence of a heavy bar at the mouth of the river has prevented its commercial development. Inferior lacquer ware is manufactured at Niigata on a large scale. The town is clean and well provided with schools, banks, newspapers, and post offices. The climate is very hot in the summer and extremely cold in the winter. Pop., 1903, 59,576; 1913, 61,233.

NIIHAU, nē'ē-hou'o͞o. See Hawaiian Islands.

NIISHIMA, nē'shĭ-mȧ, Joseph Hardy (1845–90). A Japanese educator, born in Yeddo, of a good samurai family. He received an excellent education and went to Boston, where he found a patron in Alpheus Hardy. He graduated at Amherst College and at Andover Theological Seminary. Returning home in 1874, with funds obtained from friends of the American Board of Foreign Missions, he succeeded in carrying out his educational plans. His college in Kyoto, the Doshisha, became the largest and best equipped Christian institution in the Empire.

NIJAR, nē'ʜär. A town of southeast Spain, in the Province of Almería, situated in a fertile but artificially irrigated plain, 15 miles northeast of Almería (Map: Spain, D 4). It produces much wheat, fruit, and esparto grass. There are mines of lead, iron, manganese, and phosphorite, and the town manufactures woolen blankets and fine ironstone pottery. Pop., 1900, 12,558; 1910, 12,740.

NIJMEGEN, nī'mȧ-ɢen. A city of the Netherlands. See Nimeguen.

NIJNI NOVGOROD, nyĭzh'nyȇ nôv'gô-rôt. A city in Russia. See Nizhni Novgorod.

NIKA (nē'kȧ) **RIOT**. An insurrection against the Emperor Justinian at Constantinople in 532. It was occasioned by the fights between the Blue and the Green factions of the Circus. Justinian favored the Blues at first, but when rioters of both factions were condemned to death, both Blues and Greens joined in a popular uprising. St. Sophia and many public buildings were burned. The mob forced Hypatius to assume the Imperial insignia, and Justinian wished to flee, but was dissuaded by Theodora. Finally Belisarius (q.v.) attacked the rioters in the hippodrome and put down the rebellion by the slaughter, according to some, of more than 30,000. Consult Munro and Sellery, *Medieval Civilization* (New York, 1907). See Justinian.

NI'KE (Gk. *νίκη*, victory). The Greek goddess of victory, corresponding to the Roman Victoria. She was the daughter of Styx and Pallas and sister of Zelos (zeal), Cratos (power), and Bia (force). Having assisted Zeus in his combat with the Titans, she was taken to live with him on Olympus. She is usually represented with wings and bearing a wreath and palm branch, and is often found in sculpture in connection with other divinities, especially with Athena, who is also called Nike. At Athens there was in her honor a beautiful temple on one of the bastion-like projections at the western end of the Acropolis; this has been reconstructed. As a wingless deity she was called Nike Apteros. The Roman deity Victoria was early identified with Nike. Two famous statues of Nike have been found, one at Samothrace (q.v.; see Greek Art, Plate), the other, by Paionios, at Olympia (q.v.). Consult: L. R. Farnell, *The Cults of the Greek States*, vol. i (Oxford, 1896); F. Studniczka, *Die Siegesgöttin* (Leipzig, 1898); M. L. D'Ooge, *The Acropolis of Athens* (New York, 1908).

NIKE AP'TEROS (Gk. *Νίκη Ἄπτερος*, Wingless Victory), or Athene Nike, Temple of. A beautiful small temple of simple Ionic architecture standing on a spur of the Athenian Acropolis, flanking the Propylæa. The temple was erected as part of the scheme of civic adornment undertaken by Pericles and was built by Callicrates, the architect of the Long Walls. It was torn down by the Turks in the latter part of the seventeenth century, and the material was used in the construction of a bastion. Lord Elgin took some of the slabs of its frieze to London. In 1835, when the bastion was destroyed, the stones of the building were recovered, and the temple was rebuilt on the original foundation, missing portions being supplied by terra-cotta casts. The temple, 18 by 27 feet, consists merely of a small cella, with four Ionic columns, 13½ feet high, in the front and rear. The sculptures of its frieze represented an assembly of divinities, combats between Greeks and Persians, and a combat between Greeks and Greeks.

NIKE OF SAMOTHRACE. See Olympia; Pæonius of Meude; Samothrace.

NIK'ISCH, Arthur (1855–). An Hungarian musical conductor, born at Lébény Szent-Miklós, Oct. 12, 1855. He was educated under Dessoff, Herbeck, and Hellmesberger at the Vienna Conservatory and on the conclusion of his course entered the court orchestra as a violinist. His first engagement as a conductor was at the Leipzig Theatre. Here he became noted for conducting without score, while his ability and technical skill won him a leading place. From 1889 to 1893 he was conductor of the Boston Symphony Orchestra, succeeding Wilhelm Gericke and being in turn succeeded by Emil Paur. He returned to Budapest, where he was appointed the director of the Royal Opera House and conductor of the city Philharmonic Society concerts. His most important musical engagement and the scene of his greatest success was as the successor of Reinecke (1895) in the conductorship of the Gewandhaus concerts of Leipzig. At the same time he also was the regular conductor of the Hamburg and Berlin Philharmonic orchestras. After 1897 Nikisch made extensive tours of Europe with the Berlin Philharmonic Orchestra. Following his phenomenal success in London in 1902 scarcely a season passed that he did not appear as conductor of symphony concerts and Wagner's operas in the English capital. In the spring of 1912 he made a tour of the United States with the entire London Symphony Orchestra.

NIKITIN, nyȇ-kē'tyȇn, Ivan Savitch (1824–61). A popular Russian lyric poet, born, like Koltsov (q.v.), at Voronezh and educated at the seminary of that place. His father's fortunes failing in 1843, Nikitin left school and took up the management of a road house. Towards the end of his life he kept a bookshop. Nikitin began to write for the press in 1850, attracted attention by his patriotic poem *Russia* in 1853, and in 1856 had a volume of poems published under the patronage of Count Dmitri Tolstoy. His greatest popularity was won by his poem *Kulak* (The Money-Lender) (1858), a remarkable picture of peasant life. Other well-known poems, filled with feeling, are *Burlak* (The Volga Boatman), and *The Ploughman: A Winter Night in Village*, one of his most popular lyrics. Besides his lyrics, Nikitin wrote two novels. A collected edition of his works was published at Moscow by his biographer, De Poulé (latest ed., 1911). Some of his best poems have been translated into English by C. Wilson, Ralston, Marchant, and Mrs. Rosa Newmarch. Consult R. Newmarch, *Poetry and Progress in Russia* (New York, 1907).

NIK'KO (Jap., Sun's Brightness). A small town and tourist resort in the Prefecture of Tochigi, Japan, about 80 miles northwest of Tokyo, famous for its natural beauties as well as for the mortuary shrines of Iyeyasu, the founder of the Tokugawa family, and of Iyemitsu, his grandson (Map: Japan, F 5). As a holy place its reputation dates from the eighth century, but the gorgeous mortuary shrines were not built until 1617, since which time they have been embellished by the lavish gifts of vassals, the wonders of Hidari Jingoro's wood carving, magnificent gifts of works of art in bronze, granite, and other stones, with offerings from the Dutch, Luchuans, Koreans, etc. The name Nikko is also applied to the surrounding region.

NIKLA URSS, nē'klȧ ụrs (Rum., Nicholas the Bear). See Hora, Juon.

NIKOLAEV, nyĕ'kȯ-lä'yĕf. An important naval and commercial river port in the Government of Kherson, South Russia, situated on the left bank of the river Bug, at its junction with the Ingul, 42 miles northwest of Kherson (Map: Russia, D 5). The river at Nikolaev is of sufficient width and depth for the largest vessels. The town has two Gymnasia, a naval school, an observatory, a theatre, and a number of parks. Nikolaev is among the largest commercial ports of Russia; being the chief grain port in South Russia, it is especially important in the export of grain, the imports being comparatively insignificant. The harbor is strongly fortified, and the navy yard, with its wharves and various shops, covers a large area. The industrial establishments, except those connected with the navy yard, are few and consist of tobacco factories, tallow-melting establishments, etc. The city forms a separate administrative district under a military governor, who is also commander in chief of the Black Sea fleet. There are many consular representatives at Nikolaev. Pop., 1897, 92,060; 1910, 103,491, of whom about 75 per cent were Greek Orthodox and about 17 per cent Jews. Nikolaev was founded by Potemkin in 1788. Until 1860 it was only a naval port, which, however, has played a prominent part in the building up of the Russian navy.

NIKOLAEVSK, nyĕ'kȯ-lä'yĕfsk. A town in the Government of Samara, Russia, situated on the Great Irgiz, a tributary of the Volga, 110 miles south-southwest of Samara (Map: Russia, G 4). It carries on a brisk trade in agricultural products and animals and produces brick, leather, and tallow. The town was founded by the Raskolniks (dissenters) in 1782. Pop., 1897, 12,500; 1911, 15,053, chiefly Raskolniks and including about 1900 Tatars.

NIKOLAI, nĭk'ȯ-lī. The Russian form of Nicholas (q.v.).

NIKOLAISTAD, nĭk'ȯ-lī-stȧd'. See Vasa.

NIKOLAUS CUSANUS. See Cusa, Nikolas of.

NIKON, nē'kŏn (1605–81). A patriarch of the Russian church. He was born near Nizhni Novgorod, became a priest and monk, and in 1646 was appointed, by the Czar Alexis Mikhailovitch, archimandrite of the Novospasky Monastery at Moscow. In 1648 he became Metropolitan of Novgorod, and in 1652 was elevated to the patriarchate. In 1658, having lost the favor of the Czar, he retired to the monastery of the Resurrection of Christ, which he had himself built, and in 1666 was deposed by a council called to consider his case, and banished as a common monk to a monastery at Bielozersk. Czar Feodor Alexeyevitch granted him permission to return to the monastery of the Resurrection of Christ, but he died on the journey thither. Nikon was an ardent upholder of monasticism, and was noted for his benevolent life and character, showing much kindness to the poor and unfortunate. He tried to uplift the people, promoted education, and attempted to introduce many reforms into the church, the most important of which was the effort to revise the church books and correct them according to the old Eastern liturgies. This effort met with opposition from some who were opposed to change, and led to a division in the church, the opponents being the Raskolniks (q.v.). Consult W. Palmer, *The Patriarch and the Tsar* (London, 1871–76).

NIKO'POL, or **NICOP'OLIS.** An ancient and fortified town in the north of Bulgaria, situated on the right bank of the Danube, on the direct railway from Sofia to Bucharest, and about 24 miles north-northeast of Plevna (Map: Balkan Peninsula, E 3). It is commanded by a citadel and has an old castle and a Byzantine church. The surrounding country produces good wine, and there is some trade between Nikopol and Wallachia. Pop., 1910, 5379. Nikopol is noted for the defeat here in 1396 of a large Christian army under Sigismund of Hungary by the Turks under Bajazet I. The fortress was taken by the Russians in 1810 and the fortifications were partly demolished. In 1829 a Turkish fleet was defeated by the Russians near Nikopol, and in 1877 the town was nearly destroyed by the Russian army. The Nikopolis ad Istrum, founded by Trajan, with which Nikopol is sometimes identified, is now believed to have been situated a few miles down the river.

NIKSHICH. A town in Montenegro. See Montenegro.

NILE (Lat. *Nilus*, from Gk. Νεῖλος, *Neilos*, Nile; possibly connected with Heb. *nahal*, stream, Egypt. *H'pï*), The. The largest river of Africa and the longest in the world excepting the Missouri-Mississippi, its length from the Victoria Nyanza to the Mediterranean being variously estimated, but it is about 3670 miles (Map: Africa, H 2). Authorities have definitely ascertained that the fountainhead of the Nile is a little stream situated just north of lat. 3° S., in long. 29° 30′ E., near the north extremity of the mountains bordering the northeast coast of Lake Tanganyika. This stream, rising among the mountains at a height of 6114 feet above the sea, gives birth to the Ruvuvu River, which is the mother branch of the Kagera or Alexandra Nile, emptying into Victoria Nyanza on its west coast. The area of the Nile's basin has been estimated at from 1,082,000 to 1,780,000 square miles. The general course of the river is from south to north, and though it has some largely developed sinuosities, its delta is almost directly north of Lake Albert (q.v.), through which the river flows, the delta and lake being separated by a distance of about 2000 miles.

The Nile has some special features that may be mentioned before describing it. While the river and its tributaries bring down from the tropics an enormous quantity of water, its an-

SCENE ON THE NILE

nual discharge is only equal that of smaller streams, as the Po, since much of the water that does not evaporate in the long journey northward is spread over the fields of Egypt, where it serves the double purpose of supplying moisture and fertilizing sediment. Its upper and its lower courses are navigable. Its middle course is not navigable except at very high flood, and then only with difficulty. The six cataracts of the Middle Nile extend along 1100 miles, with long stretches of smooth water between them; but this entire section of the river may be regarded as unavailable for very important navigation. These Nubian cataracts afford abundant water power, but it has never been utilized. The boundary of the Nile basin is more clearly outlined in the south than in the north. The river differs from all other great African rivers in that it passes through various climatic zones and departs very little from its main direction.

The Nile may be divided into four sections—the Upper, Middle, and Lower Nile, and the Delta, each having its distinctive aspects. The Upper Nile extends from the lakes to the confluence of the Blue and White Niles at Khartum. Being in the region of heavy tropical rains, it is distinguished as being the region of tributaries, all of them being included excepting the Atbara, which is not perennial. Three great reservoirs receive the numerous affluents in the equatorial regions. The Nile issues from the largest of these reservoirs, the Victoria Nyanza, which is nearly equal to Scotland in area and lies 3900 feet above the sea. The river, issuing from the middle of the north shore of the lake, plunges 13 feet over Ripon Falls, and is 1200 feet wide where its waters start on their journey north. This is the Victoria or Somerset Nile. It flows to the northwest, passes through the small Gita and Kioga lakes, down the Karuma rapids, thunders over Murchison Falls (120 feet high, 270 miles from the outlet), and then pursues a peaceful course for about 30 miles till it empties into the northeast corner of Lake Albert, only to emerge at the northern apex of the lake as the Bahr el Jebel, a deep and majestic stream, bound on its long journey to the Mediterranean. South of Lake Albert is Lake Albert Edward, sending its waters, collected chiefly from the great mountain mass of Ruwenzori, through the Semliki River to Lake Albert, which is 1600 feet below the level of the Victoria Nyanza. The headwaters of the upper Nile are thus collected in Lake Albert. From Lake Albert the river descends with slow current and scarcely any slope to Dufilé, where it passes between two mountain walls. Soon after leaving the mountains the slope becomes greater, the river foams over the Fola Rapids, leaves the plateau of Central Africa, enters the grass lands, and below Bor its banks are lost in the widespreading swamps on either side, and the channel splits into several branches, the Bahr el Jebel, the Bahr el Seraf, and others, which meet again in Lake No or farther down the river. In Lake No, the Bahr el Jebel meets the large tributary from the west, the Bahr el Ghazal (Gazelle River), and they leave the lake as the Bahr el Abiad or White Nile, which owes its name to the fact that in the sluggish current through the swamp region and in Lake No the sediment settles, leaving the river light in color, and this is accentuated farther down by the white waters of the Sobat tributary.

This area of swamps and branches is the vast region of the sudd (barrier), where all the channels are often completely choked by dense masses of vegetation. The current brings down fresh masses of weed, and the sectional area of the river channel is quickly reduced. The velocity of the current is consequently increased, and the succeeding portions are sucked under the original block, thus adding to its thickness. By degrees, under the severe action of the water, the whole becomes compressed into a dense and solid mass, which covers the river surface from bank to bank, and underneath which the stream rushes as through a sluice gate. These blocks at times attain a thickness of 15 feet below the water and 4 or 5 feet above it. Navigation of the river is thus rendered impossible. In 1899–1900, after the reconquest of the Sudan, the government attempted with much success to open navigation in the main channel by cutting down into the sudd, tearing the sections away by steamboats, and setting the masses thus separated afloat. In 1908 Sudan steamers experienced much difficulty in the sudd district, and tendencies towards closing of the channels were reported. This region is very unhealthful and the inhabitants are few. It is believed that the swamp and sudd region embraces an area of about 12,000 square miles. All the streams are reunited 62 miles below Lake No and receive on the right bank the Sobat River, coming from the southern extension of the Abyssinian highlands, a navigable river for 212 miles from its mouth. Below the Sobat the White Nile takes a definite northern course and flows, a mighty, though sluggish, stream to Khartum, where the White and the Blue Niles join.

The Blue Nile is a very different river. It rises in the alpine heights of Abyssinia, descends to the White Nile between its high banks with a very rapid current, and in the flood time it is reddened by the quantities of alluvia with which it is surcharged. The White Nile gives to Egypt the larger quantity of water; the Blue Nile spreads over the fields the fertile sediment that enriches them. Thus each had its distinctive function in creating Egypt out of the desert sands. Khartum, at the junction of these rivers, is at the heart of the great hydrographic system, and is naturally the metropolis of the eastern Sudan. The Blue Nile, from its great reservoir, Lake Tsana, 5840 feet above the sea, has a winding course of 839 miles down the plateau and over the plain to Khartum. Much land in its valley is suitable for agricultural development. The river needs scientific regulation so that it may best serve the interests of Egypt. Under the agreement with King Menelik of Abyssinia (1902) for the delimitation of the boundary between his country and the Sudan, the Egyptian government has authority to regulate the flow of water in the upper river. The Cape to Cairo Railroad will follow the Blue Nile for a considerable distance above Khartum, to avoid the swamp region of the White Nile. A bridge 1700 feet long crossed the Blue Nile at this station.

From a little below Khartum to the Mediterranean the river flows through one of the most arid deserts in the world, without receiving a single tributary excepting the Atbara, 180 miles below Khartum, which drains the northern highlands of Abyssinia, but is nearly dry in summer. Throughout this long course the valley of the Nile is merely a cleft in the desert plateau, the alluvial plain along the river being bounded by barren cliffs, which here and there rise to 1000 feet. The volume of the river is greatly depleted by evaporation in this part of its course. The second section of the river, the Middle Nile, extends from Khartum to Assuan, a distance of 1124 miles. It is a region of cataracts, there being 351 miles of rapids, with a total fall of 656 feet, and 773 miles of navigation, with a fall of 312 feet. The cataracts, in their order as the river is descended, may be briefly described: The Sixth Cataract, beginning 52 miles below Khartum, is a little over 1 mile long, and the drop in the river is 20 feet. The Fifth Cataract begins 28 miles north of Berber, is 100 miles long, has three principal rapids, and the descent is over 200 feet. Abu Hamed is a little below the foot of this cataract. The Fourth Cataract is between Abu Hamed and Dongola, and drops 160 feet in 68 miles. The very fertile region of Dongola is between the Fourth and the Third cataracts. The Third Cataract, with two rapids, is 45 miles long, and the fall in the river bed is 36 feet. The Second Cataract is 73 miles farther down the river, is 124 miles long, with four rapids, and it falls 216 feet. The town of Wadi-Halfa lies at its foot. The First Cataract is 214 miles farther down the Nile, is 3 miles long, drops 16 feet, and Assuan lies at its foot. The fact that below Assuan lies the great region of irrigation, fertility, and dense population, and that this portion of the Nile is hemmed in by high hills, marked Assuan as the best place to build a great dam across the river to keep back at flood time much of the water which hitherto had gone to waste, so that it might be utilized in the dry season and give Egypt perennial irrigation.

The third section of the river is the Lower Nile, extending from Assuan to the head of the Delta, an open waterway, navigable by large vessels, with Cairo near its foot. The current is slow during the low stage in summer—less than 2 feet a second. The velocity in flood is from 3¼ to 6½ feet per second. Along the lower part of this section a divergent channel known as the Bahr-Yusuf (Joseph's Canal) extends parallel to the Nile on the west side, finally discharging its waters in the depressed area of the Fayum (q.v.). The fourth section of the river is the Delta, or Garden of Egypt. It is pierced in all directions by irrigation canals and navigable channels. When the Nile is in flood its tendency is to increase the height of its banks by deposits of loam and sand. These banks are artificially strengthened and the river thus kept to a definite course. The river reaches the sea through the Rosetta and Damietta mouths, and the canals that cover the Delta like a network carry their surplus waters into a chain of salt lakes that extends behind the sandy shore. As a drainage outlet, a navigable highway, and a source of power, the Nile is surpassed by many other rivers. Its unique distinction is that it has turned Egypt from a desert into one of the richest agricultural lands, supporting a population of about 600 to the square mile. There are periods of exceptional flood and low water; but the extraordinary regularity with which, as a rule, the river rises and falls contributes to the security of farming.

The heavy rains in the basin of the White Nile during April drive the waters of that marshy region down upon Egypt, where they appear at Cairo about June 15. A fortnight later the real flood begins, for the May rains in Abyssinia fill the Blue Nile with the richest muddy water. The rise is sometimes as rapid as 3 feet a day, the flood being heightened by the large volume brought down by the Atbara. The maximum flood reaches Assuan about September 1, and it would be at Cairo a few days later were it not that the water is diverted to the land and the whole Nile valley is a great lake. For this reason the maximum flood at Cairo appears only about October 1. The rains cease in Abyssinia about the middle of September, the floods of the Blue Nile and the Atbara disappear, and then the great lakes and marshes of Central Africa are the main supply of the river until the following June. In March, during the period of low water for the White Nile, its volume is nearly double that of the Blue; in July, at high water, they are nearly equal, whereas a month or two later the Blue Nile has often three times the volume of the White. This routine of the waters is marked by marvelous regularity. The time between an early and a late flood is not more than three weeks. The height of the flood at Assuan is usually about 25 feet above the minimum supply. If the water rises 29 feet above the minimum, the crops of Egypt are in danger. If it rises only 20 feet above the minimum, large areas cannot be flooded. The mean flood discharge at Cairo is about 280,000 cubic feet per second (about equal to the average flow of the Niagara River), the maximum about 400,000 feet. The general slope of the valley on each side is away from the river. Along each edge of the river is an earthen embankment too high to be topped by the floods. Along the valley is a series of embankments, one end of which is at the river edge and the other on the sides of the hills that wall in the valley. The whole country is thus divided into a series of oblongs surrounded by artificial embankments on three sides and by the slope of the desert hills on the fourth. There are 120 of these oblongs, varying in extent from 60,000 to about 3000 acres. It is easy to cut short, deep canals in the banks which fill as the flood rises and carry the mud-charged water into these basins of irrigation. There the water remains for a month or more, 3 to 4 feet deep, depositing its mud. At the end of the flood the water is passed off through sluices from one basin to another and ultimately back into the river. In November seed is sown, and so saturated is the soil that the grain sprouts and thrives and the harvest is gathered in April or May without a drop of rain or any fresh irrigation. After the crop is reaped the fields remain dry and cracked in the fierce summer heat until the next flood comes on. A little below Cairo is a great dam or barrage across the river, by means of which all available water in the Nile before it begins to rise in June is diverted into canals that carry it to the cotton fields of the Delta. This barrage makes it possible to irrigate Delta crops in the dry season, so that to a large extent two crops a year are raised there. The water in the Delta would not be sufficient if a strict system of control were not maintained by which each cultivator is supplied in turn every 15 or 20 days.

For a considerable period there was great need for storing the waters of the Nile during flood time (when a large part of them run to waste) so that they might be turned over the fields during the months of low Nile, thus giving to Egypt the benefits of irrigation at all seasons and making it possible to raise two or three crops annually where only one or two were grown. Assuan, the gateway to Lower Egypt, was selected as the most advantageous location for the great and much desired reservoir, which was completed and formally opened in December, 1902. The work consists chiefly of an enormous wall or dam of masonry nearly 2 miles long and averaging 60 feet in height, pierced by 180 openings, each containing sluices through which the low Nile may pass and the retained flood waters may escape as they are needed for irrigation. A roadway runs along the top of the wall. (See Dams and Reservoirs.) It has been estimated by Sir William Garstin that the volume of water impounded by the dam would reach the total of 37,612,179,000 cubic feet. He estimated also that in the distribution of this reserve supply 70,000 acres in Upper Egypt, between Assuan and Assiut, will receive perennial irrigation; also 458,000 acres now irrigated as basins in Middle Egypt between Assiut and Cairo; that, further, 52,000 acres in the Fayum now untilled may be reclaimed; and that in Lower Egypt, or the Delta, the additional water will insure the cotton crop against drought and reclaim an area of 120,000 acres now uncultivated. In the Province of Ghizeh likewise an area of 106,000 acres of basin cultivation will be converted into perennially irrigated land. The original storage capacity has been increased within the last few years, by raising the level of the dam 6 meters, to about 85,100,000,000 cubic feet. Since this dam closes the Nile to navigation, a canal 6540 feet in length with four locks has been constructed around it. Mail steamers may pass through the canal, and sailing vessels may pass Assuan all the year round, though heretofore they have been able to get through the cataract only during high Nile. Below Assuan a barrage and a lock have also been constructed at Assiut for the purpose of raising the level of the river in summer, so that water may be delivered at that point at a higher level, increasing the discharge into the Ibrahimia Canal, which carries the supplies to the basins as far north as Minieh and Beni-Suef. These great works have added enormously to the productivity of Egypt, have increased the value of all the farm lands, and have augmented the revenues of the government. See Egypt; Anglo-Egyptian Sudan.

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NILES, nilz. A city in Berrien Co., Mich., 92 miles east of Chicago, Ill., on the St. Joseph River and on the Cleveland, Cincinnati, Chicago, and St. Louis and the Michigan Central railroads (Map: Michigan, C 7). It derives excellent power from the river and has extensive manufactures of all grades of paper, furniture, leather belts, steel tanks, wire screens, canvas, lightning rods, store fronts, kitchen cabinets, jacks, farm tractors, flour, etc. There are also large fan and lithographing establishments. Niles contains a Carnegie library. The government, as provided by general charter of 1896, is vested in a mayor, annually elected, and a unicameral council. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 4287; 1910, 5456. On or near the site of Niles stood Fort St. Joseph, the capture of which by the Spaniards in 1781 was the basis of Spain's claim (in 1782–83) to a large tract of Western territory. The foundations of the old fort are still visible and are indicated by a large stone marker. Early records show that a French mission was here established as early as 1697, and a complete census of a settlement in 1767 is extant.

NILES. A city in Trumbull Co., Ohio, 58 miles southeast of Cleveland, on the Mahoning River and on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads (Map: Ohio, J 3). The city is primarily a manufacturing centre, these interests being represented by sheet-steel mills, automatic-press works, boiler works, and manufactories of electric and steam cars, incandescent globes, chinaware, iron roofing, metal lath, oil tanks, foundry and blast-furnace products, mine and mill supplies, fire bricks, and galvanized iron. There is a public library. Niles, first incorporated in 1864, is governed, under a charter of 1895, by a mayor, elected every two years, and a unicameral council. The city owns and operates the water works and electric-light plant. Pop., 1900, 7468; 1910, 8361. President McKinley (q.v.) was born here, and in 1915 work was begun on an elaborate monument to his memory.

NILES, Hezekiah (1777–1839). An American journalist and publisher, born in East Bradford, Pa. He learned the printers' trade and in 1800 established himself in Wilmington, Del. Failing in business, he removed to Baltimore, where he became associated with George Bourne in the editing of the *Evening Post*. *Niles's Register* (later *Niles's National Register*), founded in 1811, was a weekly published in Baltimore until 1849, except for 1837–38, when the office was in Washington. Continued by W. O. Niles after his father's death, the files of this paper constitute a valuable source for the study of American political history of the period. The first 32 volumes (1812–1827) were reprinted. Two towns have been named for Niles, one in Ohio and one in Michigan.

NILES, John Milton (1787–1856). An American journalist and cabinet officer. He was born at Windsor, Conn., received a common-school education, studied law privately, and was admitted to the bar in 1817. The same year he settled at Hartford and established the *Times*, which under the editorial control of Niles, whose connection with it lasted for 30 years, became one of the most influential newspapers in New England. It was one of the earliest papers in the section to give its support to Andrew Jackson for the presidency. After Jackson's election Niles was made postmaster at Hartford. In 1835 he was appointed United States Senator to fill a vacancy, serving until 1839. Chosen Postmaster-General by President Van Buren (1840), he remained in office until President William H. Harrison's inauguration the next March. From 1843 to 1849 he was again Senator. He published: *The Independent Whig* (1816); *Gazetteer of Connecticut and Rhode Island* (1819), with J. C. Pease; *Life of Commodore Oliver Hazard Perry* (1820); *A History of the Revolution in Mexico and South America, with a View of Texas* (1839); *The Civil Officer* (1840).

NILGAI, nĭl′gī (Pers., Hind. *nilgau*, *nilgar*, *lilgar*, blue ox, from *nil*, Skt. *nilá*, blue + *gau*, Skt. *gau*, ox, cow). An East Indian antelope (*Boselaphus tragocamelus*) with a somewhat oxlike head and body, but with long, slender limbs, and of great activity and fleetness. It is one of the largest of antelopes and stands about 4½ feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forward. The female has no horns. The neck is deep and compressed, not rounded, as in most of the antelopes. The general color is brownish gray. A slight mane runs along the neck and the elevated forward part of the back, and the breast is adorned with a long hanging tuft of hair. The nilgai inhabits the bushy parts of India, where it has long been regarded as one of the noblest kinds of game. It is capable of domestication, but is said to manifest an irritable and capricious temper with advancing age. Consult: W. T. Blanford, *Fauna of British India: Mammals* (London, 1889); Richard Lydekker, *The Game Animals of India* (ib., 1907); and works on sport in India. See Plate of Antelopes.

NILGIRI (nē̆l′gē̇-rē̇) **HILLS,** or **NEILGHERRY** (nē̆l′gē̆-rĭ) **HILLS.** An almost isolated plateau or mountain group in the southern part of India, Presidency of Madras. It is situated about 40 miles from the west coast, 200 miles north of Cape Comorin, and rises in general to heights of between 3000 and 6000 feet above the surrounding plains, the highest point being Mount Dodabetta, with an altitude of 8640 feet. Granite ridges connect it with the neighboring Ghat Mountains, and it is itself composed of granite covered with a rich layer of soil. The slopes are covered with dense, hot, and unhealthful forest jungles, but the uplands consist of beautiful grassy plains with a temperate-zone flora and a delightful climate, which has made the Nilgiri Hills one of the principal sanatoriums in India for European invalids, who are chiefly concentrated in the town of Utakamand. The native inhabitants are Dravidian herdsmen.

NILGIRI NETTLE. See Neilgherry Nettle.

NILION, nĭl′ĭ-ŏn. See Gems.

NILOM′ETER (Gk. Νειλομέτριον, *Neilometrion*, from Νεῖλος, *Neilos*, Nile + μέτρον, *metron*, measure). A construction for measuring the height of the Nile. Two such constructions have survived from antiquity. The first is situated on the island of Roda, south of Cairo. This *mikyâs*, as it is called in Arabic, is a square well, 16 feet in diameter, with an octagonal graduated pillar of marble in the centre, marking 17 cubits of 21.386 inches. The official guarding it announces that the water has risen high enough to cut the dams and to begin the irrigation when the river has risen to 15⅔ cubits. Taxation was formerly regulated in accordance with the height of the inundation. This construction is due to the Caliph Suleiman, 715–717 A.D., but has been restored repeatedly since the ninth century. The other nilometer is situated on the island of Elephantine (q.v.), near the First Cataract. It consists of a well with a staircase of stone, and is very correctly described by Strabo. It was restored to official use in 1870.

NILSSON, nĭl′son, Christina (1843–). A Swedish soprano. She was born near Vexiö, Aug. 20, 1843, and, although her parents were in humble circumstances, she became proficient on the violin, learned the flute, and attended fairs and other places of public resort, at which she sang, accompanying herself on the violin. While performing in this manner at a fair in Ljungby in 1857, her voice attracted the attention of F. G. Tornerhjem, who sent her to Stockholm, where she received instruction from Franz Berwald. She made her début at Stockholm in 1860, and then went to Paris to continue her musical education, under Masset and Wartel. In 1864 she appeared at the Théâtre Lyrique of Paris, as Violetta in *La Traviata*, with such success that she was engaged for three years. She made her first appearance in London in 1867, where she immediately became a favorite. In 1868 she sang the part of Ophelia in the opera *Hamlet*, by Ambroise Thomas, at the Grand Opéra in Paris. During the same year she sang in England at the Handel festival at the Crystal Palace. In 1870 she came to America, appearing in concerts and operas, and achieved popularity wherever she was heard. She was married in 1872 to Auguste Rouzaud, a merchant of Paris. After leaving St. Petersburg, where she had been very successful, she returned to America with the Strakosch Italian opera troupe. She also sang Elsa in Wagner's *Lohengrin*. After her marriage she retired; then, upon her husband's death, returned to the operatic stage, but her marriage to Count Miranda in 1887 brought about her permanent retirement in 1888. What her voice lacked in volume was compensated for in smoothness, sweetness, and evenness of tone.

NIMBLE FLY. A fly of the family Dexiidæ, a group allied to the parasitic family Tachinidæ, so called from its rapid movements. The legs are unusually long, and in early stages the fly is parasitic in various insects, especially in beetles and also in snails. About 50 species inhabit North America.

NIM'BUS. See CLOUD.

NIMBUS (Lat., cloud). In art, especially in sacred art, the name given to the disk or halo which encircles the head of the sacred personage who is represented. It is used in Oriental art, pictures and images of Buddha with the nimbus being very common. In the West it was used in Hellenic and Roman art to indicate gods, heroes, and the deified emperors. It was gradually borrowed in Christian art, until before the close of the sixth century its use was common. Later it became almost a necessary appendage of all representations of God or of the saints. It is of two kinds—either circumscribed by a well-defined outline, or radiating in vanishing lines. It took various forms. The square or oblong shape indicated a saintly person, such as a pope, still living, and was used mainly between the fifth and ninth centuries. The square form was symbolic of the material and earthly. The common form was the circular, symbolic of the spiritual and perfect. The earliest figure to receive the nimbus was that of Christ, and this nimbus almost immediately took a peculiar form, which was ordinarily given to him up to the sixth century, and this was the monogram ☧ or ⳨ in the shape of a cross, called the Constantinian monogram (see LABARUM), formed of the first two letters of the Greek word for Christ, circumscribed in the circle and appearing above and on either side of his head. This became, after the sixth century, the ordinary cruciform nimbus, which was the rule up to the Renaissance, when the nimbus went out of fashion for all figures except occasionally in the form of a poised circlet or band. The interior of the nimbus, of whatever form, is gilt, either plain or in rays, excepting occasionally that of the Virgin, made of blue or some other color or starred. Up to the Renaissance the nimbus forms a circle against the background, but Renaissance artists tilted it or poised it naturalistically. God the Father was not represented until the late Middle Ages, and to Him was given a circular nimbus, but the Renaissance often gave it a triangular radiating shape. The dove of the Holy Ghost also had a circular nimbus. So had all duly canonized saints, for it was a symbol of the blessedness of eternal life in heaven. In later art the nimbus became lighter and more aërial, melting, as it were, into the picture; and in Raphael's saints it occasionally fades into the very faintest indication of a golden tinge around the head. Mosaic paintings, frescoes, illuminated manuscripts, and altarpieces are the principal classes of monuments illustrating the use of the nimbus. See ICONOGRAPHY. Consult Adolf Krücke, *Der Nimbus und verwandte Attribute in der frühchristliche Kunst* (Strassburg, 1905).

NIMEGUEN, nĭm'ā'gen (Dutch *Nijmegen*). A city in the Province of Gelderland, Holland, on the Waal, 4 miles from the German frontier (Map: Netherlands, D 3). It is situated on several hills, has the form of an amphitheatre, and is, for the most part, poorly built, with steep and narrow streets. The town was strongly fortified, but the ramparts have been changed into promenades. Among the noteworthy edifices are the church of St. Stephen, a handsome Gothic structure of the thirteenth century, containing the burial vault of Anna Katherina of Bourbon, and the town hall, with a museum of Roman antiquities. In the beautiful Valkhof Park are ruins of the ancient Imperial palace of the Carolingians. A Gymnasium and a seminary for teachers are located here. Nimeguen is a large market for cattle and agricultural products, especially grain and wine. It is noted for its weissbier and its eau de cologne and has manufactures of flour, cigars, tin, cutlery, metal goods, lime, gold and silver work, leather, and furniture. It has an important trade in grain. Pop., 1900, 42,756; 1910, 56,035, chiefly Catholics.

Nimeguen was the Roman Noviomagus, a permanent camp, in order to keep in subjection the Teutonic tribes northeast of the Rhine. In the Middle Ages it was a member of the Hanseatic League. It was taken by the Spaniards in 1585, but was recovered six years later. The Peace of Nimeguen in 1678–79 brought to a close the war between France and the Dutch and their allies, initiated by Louis XIV's invasion of the Netherlands in 1672. The Peace of Nimeguen was the culminating point in Louis XIV's career and made France the leading power of Europe.

NÎMES, nêm. The capital of the Department of Gard, France, in Lower Languedoc, situated on a fertile plain at the southern base of a range of outlying hills of the Cévennes, 174 miles south-southwest of Lyons (Map: France, S., J 5). The climate is not particularly agreeable, owing to its winds and dust storms and to its heat in summer. It is a unique city in that it contains very ancient constructions side by side with modern and handsome buildings, streets, etc. It has splendid monuments of Roman times, and its antiquities are of almost every description. The fine Esplanade is approached by the spacious Avenue Feuchères and flanked by the immense Roman amphitheatre, *Les Arènes*, an ellipse 438 feet long. It is built of large stones, joined without mortar, and had capacity for seating 24,000. The original structure dates from the beginning of the Christian era and the restoration from 1858. The modern courthouse and a fountain with five statues by Pradier also centre on the Esplanade.

The most striking structure in Nîmes is the far-famed Maison-Carrée, an imposing Roman temple, well preserved. It is 76 feet long and 40 feet wide and is embellished with 30 Corinthian columns. The whole edifice is in excellent taste and possesses rich features. It is thought to have been built early in our era, being dedicated to Caius and Lucius Cæsar. After having served various degraded uses during the centuries, it was restored in 1824 and part of it used as a museum of Roman antiquities. Its Venus of Nîmes, however, is mediocre. The Romanesque church of St. Paul has splendid mural paintings by the two Flandrins. Nîmes has a Reformed Grand Temple of a very simple architectural style. The cathedral of St. Castor was built of materials from ancient ruins, on whose site it stands. The Jardin de la Fontaine is a lovely garden, with a canal, cascades and basins, and a statue of Antoninus Pius, who was born in Nîmes. Among the Roman remains are the Tour Magne, 92 feet high, affording a fine view, a little temple of Diana, and the Porte d'Auguste. The Hôtel-Dieu has an attractive façade. The Central Prison, with a capacity for 1400 persons, was an ancient citadel.

The city's institutions include a school of fine arts, training colleges, a priests' seminary, a school of music, and a library of 110,000 volumes. In the southern part there is a gallery of painting and sculpture. Nîmes has a Calvinistic consistory, a lyceum, a Protestant normal school for women, a Catholic seminary for priests, and industrial and art schools. It is the seat of a bishop. The industries include the manufacture of silk, wine, liquors, upholstery, shawls, lace, handkerchiefs, gloves, furniture, hosiery, clothing, candles, carpets, leather, and iron products. It is an important wine and brandy market. There are limestone quarries near by. Pop., 1901, 80,605; 1911, 80,437, nearly one-fourth being of the Reformed faith.

Nîmes (Lat. *Nemausus*) was the leading Roman colony in Gaul after 120 B.C., and was a provincial city of true magnificence. It fell under the scourge of the Vandals in 407 A.D., and was plundered by the Northmen in 859. It turned Calvinist at the Reformation and entered upon a troubled career. After the fall of Napoleon its citizens—or the Bandes Verdets—persecuted the Protestants. Guizot and Daudet were born there. The beautiful ruined Pont du Gard, a Roman aqueduct, is northeast of Nîmes. Consult H. Bazin, *Nîmes gallo-romain* (Paris, 1891), and R. Peyre, *Nîmes, Arles, et Orange* (Nîmes, 1903).

NIMRA′VUS (Neo-Lat., from *Nimr-od* + Lat. *avus*, ancestor). A fossil cat found in the John Day Miocene beds of western North America. See Sabre-Toothed Tiger.

NIM′ROD (Heb. *Nimrōd*). According to Gen. x. 8 ff. (1 Chron. i. 10), the founder of the Babylonian and later of the Assyrian Empire; also "a mighty hunter before Yahwe." No explanation of the name and legend has as yet received common assent. By some scholars Nimrod is identified either with the Babylonian god Marduk or with Gilgamesh (q.v.), the hero of the Babylonian epic, who appears typically in art as engaged in combat with a wild beast, and is associated with Erech, one of Nimrod's cities. It has been thought that Cush, the father of Nimrod, represents the Kassites, a people that ruled Babylonia from 1761 to 1185 B.C. (See Kassites.) The four cities of Nimrod's kingdom, Babel, Erech, Accad, and Calneh (probably Nippur), mentioned in Gen. x. 10 are ancient and famous. That "out of that land he went forth into Assyria [the proper translation], and built Nineveh, Rehoboth-ir, Calah, and Resen" (Gen. x. 11–12), expresses the conviction that Assyria is a Babylonian colony, and apparently also that the four Assyrian cities were founded later than the appearance of the Kassites in Babylonia, which would not be in harmony with known historic facts. Of the cities mentioned, Rehoboth and Resen are not yet identified. In Mic. v. 6 "the land of Nimrod" is in parallelism to "the land of Assyria." On the other hand, Eduard Meyer has long maintained that the home of this figure is in Libya, where names of this type are not uncommon, and he thinks that through a confusion of Cush = Ethiopian with Cush = Kassite Nimrod was made the builder of Babylonian and Assyrian cities. The characterization of Nimrod as a huntsman (an ancient and doubtless pre-Israelite saying) would be appropriate to a mythological character or to many an Oriental monarch. The mythological expression "a mighty hunter before Yahwe" would mean that Nimrod attracted the attention of the deities by his prowess, or even rivaled them in the art of hunting. Consult: G. C. C. Maspero, *Dawn of Civilization* (London, 1894); A. H. Sayce, *Patriarchal Palestine* (ib., 1895); Eduard Meyer, *Die Israeliten* (Halle, 1906); id., *Geschichte des Altertums*, vol. i (3d ed., Stuttgart, 1913).

NIM′RUD. The modern name of a mound on the east bank of the Tigris, about 20 miles below Mosul (Map: Turkey in Asia, K 4), marking the ruins of an ancient Assyrian city identical with Calah (q.v.) mentioned in Gen. x. 11. The chief discoveries were made at Nimrud by Layard in 1845–47 and 1849–51, though there were also later excavations by George Smith and Rassam. The city was a quadrangle about 5 miles in circumference, surrounded by a wall with towers. The most important buildings discovered were: (1) a stage tower (*zikkurrat*) at the northwest corner of the mound, 167 feet square and 140 feet high, with seven stages; (2) temples near the tower, in which valuable inscriptions were found; (3) the so-called northwest palace, 350 feet square, built by Asurnazirpal III (885–860), and restored by Sargon II (722–705 B.C.); the sculptures found here were particularly fine and instructive, and there was a rich harvest of small objects of art, utensils of daily life, tools, armor, and the like; (4) the centre palace of Shalmaneser III, 860–825 B.C., rebuilt by Tiglath-pileser IV, 745–727 B.C.; here was found one of the most interesting of all Assyriological monuments—the famous black obelisk of Shalmaneser III, now in the British Museum, which gives an account of the campaigns of the King during 31 years of his reign; (5) the southwest palace (Esarhaddon's, 681–668 B.C.), built with materials taken from the northwest and centre palaces; (6) the southeast palace (Asuritililaniukin's, after 625 B.C.); (7) a temple of Nebo, at first wrongly called the tomb of Sardanapalus. For the history of the city, which was the capital of the Assyrian Empire for at least two centuries, and was finally destroyed by the Medes c.606 B.C., see Calah. Cf. also Assyria; Assyrian Art; Nineveh.

NIMWEGEN, nĭm′wā′gen. A city of the Netherlands. See Nimeguen.

NINDE, nĭnd, William Xavier (1832–1901). An American Methodist Episcopal bishop, born at Cortlandville, N. Y. He graduated from Wesleyan University (Connecticut) in 1855. From 1861 to 1868 he was pastor of a church in Cincinnati, Ohio, then traveled through Europe and the East; and afterward occupied the pulpit of the Central Methodist Episcopal Church, Detroit. His terms here were divided by a period as professor of practical theology in Garrett Biblical Institute. Of this institution he was president from 1879 to 1884, when he was chosen bishop. A member of the General Conferences of 1876 and 1884, and a member of and speaker at the Ecumenical Methodist Conference held in London in 1881, from 1896 to 1900 Bishop Ninde was president of the Epworth League, succeeding Bishop J. N. Fitzgerald. In 1894 he made an episcopal visitation to the Methodist missions in China, Japan, and Korea. He died at Detroit. Consult the memoir by his daughter, Mary L. Ninde (New York, 1902).

NINDEMANN, nĭn'de-mȧn, William Friedrich Carl (1850–1913). An American Arctic explorer, born on the island of Rügen, Germany. At 17 he came to the United States. Nindemann joined the *Polaris* expedition (see Hall, Charles F.), and in 1872, when the vessel was caught in the ice, with 18 of the crew he was carried on an ice floe for nearly seven months. Rescued off Labrador by the *Tigress*, he served on that vessel in the search for the *Polaris* (1873). From that year to 1881 he was a member of the *Jeannette* expedition under G. W. De Long (q.v.). After the leader reached the Lena delta, he sent Nindemann south for supplies. The latter subsequently joined in the search for the party. During the Spanish-American War he served as gunner on the submarine *Holland.*

NINE-EYES. In England, a lamprey (q.v.).

NINEKILLER. One of several similar names applied to shrikes, this one expressing a German rustic notion that the bird murders nine victims in a series. Cf. Butcher Bird.

NINETY-SIX. A village in Abbeville Co., S. C., about 80 miles southwest of Camden, and so named from its having been located 96 miles from Keowee, the principal town of the Cherokees. During the Revolutionary War it was an important strategic point, and in 1781, while occupied by a Loyalist force of about 550, under Lieutenant Colonel Cruger, was unsuccessfully besieged by a force of Americans, under General Greene, from May 22 to June 19, when, on receiving news of the near approach of a greatly superior British force under Lord Rawdon, General Greene withdrew. The loss of the Americans, incurred chiefly during an assault on June 18, was about 185 in killed and wounded; that of the Loyalists was about 85. On June 29 the place was evacuated by Lord Rawdon. Consult Edward McCrady, *The History of South Carolina in the Revolution* (New York, 1902).

NIN'EVEH. The later capital of the great Assyrian Empire. The etymology of the name (written *Ninua* and *Ninâ* in cuneiform inscriptions) is unknown. A popular etymology connected it with *nûnu* (fish) and made Nineveh the fish city. Presumably the word is connected in some way with *Ninâ*, a Sumerian goddess, subsequently identified with Ishtar (q.v.). Nineveh was situated on the east bank of the Tigris, opposite the present Mosul (Map: Turkey in Asia, E 3), where for centuries its ruins were indicated by a number of mounds, the two principal ones being known as Kuyunjik and Nebi Yunus, the latter the traditional site of the preaching of the prophet Jonah and crowned by a famous Mohammedan shrine. References in Arabic geographers and early European travelers show that the location was always preserved in local tradition, although the value of this tradition was called in question in the eighteenth century. Its trustworthiness was established by Claudius James Rich, whose examination of the mounds in 1821 marks the beginning of scientific investigation; he gave the first accurate description and prepared excellent maps (published, after his death, in 1836). The first excavations were made at Kuyunjik by Paul Botta in 1842–43. At this early stage of Assyriological investigation sculptures or other large objects which could be sent to Europe and arouse popular wonder were the main desiderata; and when three months' labor had brought to light nothing but fragments of reliefs and inscriptions, Botta considered the work disappointing and abandoned Kuyunjik for Khorsabad (q.v.), the ancient Dur Sharrukin. Layard, while excavating at Nimrud (q.v.), the ancient Calah (q.v.), in 1845–47, dug a few trenches at Kuyunjik and made a tentative examination which located the so-called southwest palace (Sennacherib's). During his second expedition (1849–51) he made a more thorough examination of this palace, brought to light numerous valuable sculptures, and discovered the famous library of Asurbanipal. After Layard's departure operations were continued by Rassam (1852–54), while Victor Place was also attempting to excavate at the same mound, the work of the two investigators not always proceeding in a spirit of friendly coöperation. Rassam discovered the north palace (Asurbanipal's), the sculptures of which belong to the finest specimens of Assyrian art. He also found here the second half of Asurbanipal's library, including one of the Babylonian accounts of the deluge (q.v.). After Rassam's departure the examination of the palace was continued for a short time by Loftus and Boutcher. The next attempt at Kuyunjik was made by George Smith during two brief periods aggregating not more than three months together in 1873–74, and resulted mainly in the recovery of inscriptions from Asurbanipal's library, popularly considered disappointing after the brilliant success of Layard and Rassam, but in reality as important as any discoveries yet made. Rassam, during his four campaigns in 1878–82, made further excavations at Kuyunjik; owing to the unfortunate attempt to do too much and the unsystematic and unscholarly methods followed, the results were not all that could have been desired. Rassam also excavated at this time at Balawat (q.v.), the ancient Imgur Bel, about 15 miles east of Mosul, and attempted without success to examine Nebi Yunus. It is known that the latter mound contains memorials of Adadnirari V (812–783 B.C.) and palaces of Sennacherib (705–681 B.C.) and Esarhaddon (681–668 B.C.). Although some examination was made by Wallis Budge in 1888–89 and by L. King in 1902, no serious excavation of this mound has yet been undertaken; and much still remains to be done at Kuyunjik. The earliest explorations of Layard were carried on at the expense of Sir Stratford Canning and Layard himself; other investigations have been supported by the British Museum, where most of the antiquities discovered are now stored. Besides ornaments, seals, and similar small objects of great importance as works of art, colossal statues were found, and small bas-reliefs representing incidents of war, hunting scenes, sacrificial rites, religious processions, building operations, and other events of daily life. The inscriptions on clay cylinders, obelisks, slabs, statues, and tablets of stone and other material have furnished data for the history of Nineveh and the Assyrian Empire. No such systematic work of excavation has been undertaken at Nineveh as that of the Deutsche Orientgesellschaft at Assur (Kalat Sherkat).

The ancient city was a strongly fortified town, an irregular trapezium in shape. The walls have been traced and found to have been about 1¼ miles in length on the north, something less than 3 miles on the east, about ½ mile on the south, and 2½ miles along the Tigris on the west. A remarkable gate was discovered by Layard near the centre of the northern wall; on the city side there were colossal man-headed bulls and winged human figures. The river Khosar flowed through the city from west to east, dividing it into two nearly equal parts. The superficial area was about 1800 acres. According to a statement of the Book of Jonah (iv. 11), the population when the city was at the height of its glory has been estimated at 600,000. This is probably too great. Commander Jones calculated in 1852 that the population of the city and suburbs cannot have exceeded 350,000, while the city itself may have been the home of about 175,000 souls. Even this may be an exaggerated estimate.

The first certain mention of Nineveh is in the code of Hammurapi (2124–2801 B.C.). It is not quite clear whether a reference by Gudea of Lagash is to an Ishtar temple in Nineveh or in Nina, a quarter of Lagash. The earliest seat of the Assyrian rulers was at Assur (q.v.), the modern Kalat Sherkat, on the west bank of the Tigris, about 50 miles below Mosul. The seat of government was first transferred to Calah (Nimrud, q.v.). Shalmaneser I (1320–1290 B.C.), who calls himself the builder of the latter city, is known to have restored a temple of Ishtar at Nineveh, which is also mentioned in an inscription of Samsi Adad II (c.1870–1840 B.C.) and in the code of Hammurapi. From the time of Asurbelkala (c.1105 B.C.) to the reign of Asurnazirpal III (885–860 B.C.) Nineveh was the capital. The latter King returned to Calah, but in the days of Sennacherib (705–681 B.C.) Nineveh regained its position. Sennacherib's predecessor, Sargon II (722–705 B.C.), seems to have given the preference to Khorsabad. Under Sennacherib and his successors Nineveh attained its greatest prosperity and fame. It fell before the combined efforts of Medes and Babylonians, the Median King, Cyaxares (625–585 B.C.), entering into an alliance with the Babylonian King, Nabopolassar (625–605 B.C.), for the destruction of the Assyrian Empire. Though it was saved from the first attack of Cyaxares in 625 through the timely assistance of Assyria's ally, King Madyas of Scythia, the inevitable catastrophe was only deferred. The last days of Nineveh are obscure. That the city held out for a considerable time by virtue of its strong fortifications is probable. It probably fell in the year 606 B.C. According to tradition its King, Sinsariskun, ended his life in the flames which consumed his capital. The destruction of the city was complete. Xenophon with the Ten Thousand Greeks passed by its site about two centuries later, and does not even mention its name. It is probable, however, that the "great uninhabited cities" which he calls Mespila and Larissa (*Anab.* iii, 4, 7–12) were Kuyunjik and Nebi Yunus, respectively.

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NINE WORTHIES, THE. Nine heroes of history and romance, long popular in mediæval art and story. They are mentioned in the preface to Caxton's Malory's *Morte d'Arthur* as the "Nine Worthy and the best that ever were"; to wit, three Paynims, three Jews, and three Christian men. These are Hector of Troy, Alexander the Great, Julius Cæsar, Joshua, David, Judas Maccabæus, King Arthur, Charlemagne, and Godfrey of Bouillon. These heroes were a familiar and popular subject in tapestries and paintings, and figured also in masks and pageants. Dunlop mentions in *History of Prose Fiction* a rare romance, the "Triumphes des neuf preux." Shakespeare parodies them in *Love's Labor's Lost*, and Dryden alludes to them in *The Flower and the Leaf*.

NINGPO, nĭng'pō' (Chin., Calm Waves). A treaty port in the Province of Chekiang, China, on the river Tatsish, 12 miles from the sea (Map: China, M 6). The inclosed space is about 5 miles in circumference. The brick walls, 25 feet high and 22 feet thick at the base, are pierced by six gates. The city is famous for its temples, pagoda, stone bridges, wide streets, and a library, the fourth in point of number of volumes in the country. The gold and silver work, confectionery, lacquer work, and carving are noted all over China. The Portuguese settled in 1522 in Ningpo, but were driven out in 1545 after a massacre, in which 800 out of 1200 Europeans were slain. The city was occupied by the British forces for six months in 1841–42, and was opened to foreign trade in 1842. It is an important centre of Christian missions. Ningpo has little direct trade and is principally a distributing station for Shanghai. In 1912 net imports amounted to 13,386,741 hk. tls., and exports to 8,915,469 hk. tls., a total trade for the year of 22,302,210 hk. tls. The principal articles of commerce are green tea, cotton, silk, carpets, fish, and sugar. Its seaport is Ching-hai. The foreign trade of Ningpo has suffered through the opening of Hangchow. The population in 1910 was estimated at 450,000.

NIN′IAN, Saint. The Apostle of the Picts. He lived in the latter half of the fourth and the beginning of the fifth century. Whether Christianity had been introduced among the Picts before the time of Ninian has been a subject of controversy. However this may be, it is certain that when Ninian appeared among them the Picts were in the main a pagan people. He was a Briton and of noble birth, but had been educated at Rome and there ordained Bishop in 394. The exact time of his preaching in Scotland is unknown. His labors appear to have commenced in Cumbria and to have extended over the greater part of the district as far north as the Grampian Hills, his see being fixed at Candida Casa, or Whithorn, in the modern Wigtonshire. His death is placed by the Bollandists in 432. His festival is September 16. Most of the little real knowledge we have of him is from Bede's *History*, vol. iii (ed. Plummer, Oxford, 1896; Sellar, London, 1907). His *Life*, largely legendary, by Ailred, is in A. P. Forbes, *Historians of Scotland*, vol. v (Edinburgh, 1875). Consult also MacKinnon, *Ninian und sein Einflus auf die Ausbreitung des Christentums in Nord-Brittanien* (Heidelberg, 1891).

NIN′IGRET (c.1610–c.1677). A sachem of an Algonquian tribe of Indians, the Niantics. He assisted the English colonists in the Pequot War of 1637, but a visit to the Dutch on Manhattan Island in 1652–53 caused him to be suspected of plotting against the Colonies composing the New England Confederation, whose commissioners, in April, 1653, declared war against him, but were unable to prosecute it, owing to the opposition of Massachusetts. Ninigret, however, soon attacked the Long Island Indians, allies of the English, and the commissioners, after summoning him in vain to Hartford, sent Maj. Samuel Willard against him with a force of 310 men. Ninigret took refuge in a swamp, but subsequently (1662), in conjunction with several other chiefs, sold a large part of his territory to the colonists. Several of his successors from whom land titles were secured by Rhode Island were also called Ninigret.

NIÑO, nē̆′nyȯ, Pedro Alonso (1468–c.1505). A Spanish navigator, born at Moguer. He had sailed to the west coast of Africa several times in Portuguese vessels before 1492, when he became pilot of one of Columbus' three ships. In June, 1496, Niño sailed to Santo Domingo with supplies and on his return nearly ruined the fortunes of Columbus by his braggadocio and his tardiness in reporting at court. He also went on Columbus' third voyage. With two brothers, Cristóbal de la Guerra, who served as pilot of the ship, and Luís de la Guerra, a Spanish merchant, he planned what proved the first successful commercial voyage to the New World (1499). Niño died soon after his return, after being accused of cheating the crown of a part of its share in the profits of the voyage and before the conclusion of the trial resulting therefrom.

NINON DE L'ENCLOS, nē̂′nôɴ de läɴ′klṓ′, or Lenclos (1616–1706). A Parisian courtesan, remarkable for beauty, grace, and intellectual culture, as well as for keen wit. Her career began at 16. Among her many lovers were some of the greatest names of France. She counted among her friends Queen Christina of Sweden, Madame Scarron (afterward Madame de Maintenon), and Madame de La Fayette. Her salon seemed for a time a rival of the Hôtel de Rambouillet. Molière and Scarron are said to have taken literary counsel with her. Her beauty lasted into old age. Consult Douxmesnil, *Mémoires* (Rotterdam, 1752), and the *Works* of Saint-Evremond (Amsterdam, 1706), but especially the contemporary "portrait" in Mademoiselle de Scudéry's *Clélie* (Paris, 1556–60), where she figures as Clarisse.

NIO. See Ios.

NIOBE, nī′ô-bē̇ (Lat., from Gk. Νιόβη). In Greek legend, the daughter of Tantalus, King of Lydia, and (according to the most popular version) the sister of Pelops. She was the wife of Amphion, King of Thebes, and bore him many children, the numbers varying usually, in the stories, between 12 and 20. In her pride she boasted her superiority to Leto, mother only of Apollo and Artemis. The angry goddess moved her children to avenge the insult, and Apollo with his arrows slew the sons, while Artemis killed the daughters in the palace. Niobe in her grief prayed the gods, who in pity transformed her into a stone image on Mount Sipylus in Lydia. The story appears in the epic and was retold by tragedians, poets, and chroniclers with many divergences in detail. The fullest version which has survived is by Ovid (*Metam.*, vi, 146 et seq.). Representations of the story on vases and reliefs are not numerous, but it is the subject of one of the most famous groups of ancient statues (Pliny, *Nat. Hist.*, xxxvi, 4). A Roman copy of this group is in the Uffizi Gallery at Florence. Consult: C. B. Stark, *Niobe und die Niobiden* (Leipzig, 1863); Mayerhöfer and Ohlrich, *Die florentine Niobegruppe* (1881, 1888); A. Preuner, in *Bursian's Jahresbericht*, vol. xxv (Leipzig, 1891); W. Amelung, *Führer durch die Antiken in Florenz* (Munich, 1897); the article "Niobe," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iv (Leipzig, 1897–1909).

NIO′BIUM (Neo-Lat., from Lat. *Niobe*, daughter of Tantalus; so called from its close resemblance to the metal tantalum, from Lat. *Tantalus*, father of Niobe). A metallic chemical element, same as columbium (q.v.).

NIOBRARA, nī′ô-brâr′ȧ. A river rising in the southeastern part of Wyoming, flowing east through northern Nebraska and emptying into the Missouri River at Niobrara after a course of about 450 miles (Map: Nebraska, C 2). It is a shallow and rapid stream and is not navigable.

NIORT, nyôr. The capital of the Department of Deux-Sèvres, France, on the Sèvre-Niortaise River, 40 miles southwest of Poitiers (Map: France, N., E 6). Its chief points of interest are the church of Notre Dame, with its famous tower and elaborate interior, the church of St. Andrew, the donjon of an old castle, the town hall, the museum of art and natural history, the museum of antiquities, and the public garden. The town has a large trade in gloves, dressed chamois, oil, brushes, shoes, and leather; there are also large nurseries. Niort dates from 1155, was under the rule of England for a short period, and as a Protestant stronghold endured many hardships during the religious wars. Madame de Maintenon was a native of Niort. Pop., 1901, 23,897; 1911, 23,775.

NIOX, ny-ôks′, Gustave Léon (1840–). A French soldier, born at Provins, Seine-et-Marne. His father, a colonel, died at Sebastopol. He was educated at the Prytanée Militaire de la Flèche, took part in the Mexican campaign of 1862–65, and in 1870–71 was in high command in Paris during the siege. He taught geography at the Ecole Supérieure de Guerre and became commandant of the Invalides and director of the army museum. He wrote: *Recit historique de l'expédition du Mexique* (1874); *Simple recit de la guerre de 1870–71* (1897), crowned by the Academy; and edited *Collection d'ouvrages de géographie militaire* (6 vols., 1876 et seq.) and an *Atlas de géographie générale* (1887 et seq.).

NI′PA (Neo-Lat., from the native name). A genus of plants referred by most botanists to the family Palmæ. *Nipa fruticans*, the only species recognized, common in the East Indian archipelago, is a low-growing tree, which flourishes with the mangrove in places inundated by the tide. It abounds in saccharine sap, from which a kind of palm wine and also excellent sugar are made. The leaves are extensively employed for thatching houses, being much more durable for this purpose than any other of the palm trees.

NIPAL. See Nepal.

NIPH′ER, Francis Eugene (1847–). An American electrical engineer and physicist. He was born at Port Byron, N. Y., graduated from the State University of Iowa in 1870, and after four years as instructor of physics in that institution was chosen professor of physics and of electrical engineering in Washington University, St. Louis. Nipher organized the Missouri weather service (1877) and the Magnetic Survey of the State (1878) and was president of the St. Louis Academy of Science (1885–90). His more interesting researches include his proof that a photographic plate overexposed may be developed as a positive, and that between positive and negative there is a zero value which cannot be developed. He is author of *Theory of Magnetic Measurements* (1886); *Electricity and Magnetism* (1895); *Introduction to Graphical Algebra* (1898); *Experimental Studies in Electricity and Magnetism* (1914).

NIPHUS, Augustinus. See Nifo, Agostino.

NIPIGON, nĭp′ĭ-gŏn (or **NEPIGON**), Lake. A lake of Ontario, Canada, 35 miles north of Lake Superior (Map: Ontario, H 8). It is about 60 miles long from north to south and 45 miles wide. A coast line with bold headlands and deep bays gives a total length of shore of 580 miles. It is 813 feet above Lake Superior. A great number of mountain streams flow into it, and its waters flow out through the Nipigon River, 40 miles in length, southward, to Nipigon Bay, an arm of Lake Superior.

NIPISSING, nĭp′ĭs-sĭng (still-water place, or little-water place). An Algonquian tribe, formerly residing about the lake of the same name in northern Ontario, Canada. When first known to the French, early in the seventeenth century, they were one of the most prominent and influential tribes of Canada and were regarded by the Jesuit missionaries as the typical Algonquian tribe and their language as the standard for the whole linguistic stock. On the destruction of the missions by the Iroquois about 1650 they were forced to fly to the north and west, almost to the extreme western end of Lake Superior. They afterward returned and settled, some in their old country on the lake shores, others at the Three Rivers, and also with the Catholic Iroquois at the Lake of Two Mountains, near Montreal, where they still have a village. It is impossible to give any reliable statement of the past or present number of the Nipissing, as they are generally included in the estimates with the other tribes known collectively as Algonquian (q.v.). The Indians now on a reservation on Lake Nipissing are officially classed as Ojibwa (q.v.).

NIPISSING (or **NEPISSING**), Lake. A lake in Ontario, Canada, nearly midway between Georgian Bay and the Ottawa River, with a length of about 55 miles and a maximum breadth of 28 miles (Map: Ontario, E 1). Its waters are mostly received from the north through Sturgeon River, which connects it with a chain of smaller lakes. The only outlet is French River, by which the lake discharges into Georgian Bay, an inlet of Lake Huron. There are a number of small islands. The vicinity is inhabited by Indians. There is a regular steamer service on the lake, and its waters and shores are extensively resorted to for angling and shooting. A low divide, which is the proposed summit level of the projected Ottawa Georgian Bay Canal, separates it from the Mattawa River and the Ottawa basin. Le Caron, a Recollet priest, was the first European to visit the lake, in 1614.

NIP′MUC (fresh-water people). A collective term for the small inland tribes of Algonquian stock formerly living in central Massachusetts and the adjacent sections of Connecticut and Rhode Island. Their chief seats were at the headwaters of the Blackstone and the Quinebaug rivers and about the ponds of Brookfield. Their villages had no apparent political connection, and the various bands were subject to their more powerful neighbors, the Massachuset, the Wampanoag, the Narraganset, and the Mohegan, or even tributary to the distant Mohawk. There were seven villages of praying Indians among them in 1674, but on the outbreak of King Philip's War the next year almost all of them joined the hostiles, and at its close some of them fled to Canada or westward to the Mohican and others to the districts about the Hudson.

NIPPER. See Cunner.

NIPPLES. See Breast; Mammary Gland, Diseases of.

NIPPOLD, nĭ′pōlt, Friedrich (1838–). A German Church historian. He was born at Emmerich and studied at Halle, Bonn, Amsterdam, and Leyden. In 1865 he joined the faculty of the University at Heidelberg, going to Bern in 1871 as professor of Church history, and to

Jena in 1883. Nippold became a representative of liberal theology and took a leading part in the modern Church movement. His numerous theological treatises include: *Handbuch der neuesten Kirchengeschichte* (1867; 5th ed., 1903–06), his chief work; *Welche Wege führen nach Rom?* (1869); *Zur geschichtlichen Würdigung der Religion Christi* (1884–86); *Der christliche Adel deutscher Nation* (1893); *Kleine Schriften zur inneren Geschichte des Katholizismus* (1899); *Das deutsche Christuslied des 19. Jahrhunderts* (1903); *Moderne Klostergründungen* (1910); *Führende Persönlichkeiten zur Zeit der Gründung des deutsches Reiches* (1911).

NIP'PON, or **NIHON**, nē'hŏn'. The Japanese pronunciation of the name Jih-pen (sun origin) given to Japan by the Chinese. Japan is a corruption of the same words. The name was employed first officially by the Japanese government about 670 A.D. Before that time various high-sounding titles had been used, and two native names still survive in literature—Yamato, strictly speaking, the name of a province, and O-mi-kuni (great august country). Nippon was misapplied by Occidentals for a time as the name of the largest island of the archipelago.

NIP'PUR (modern name, NUFFAR). One of the most important cities of ancient Babylonia, situated on the northeast edge of the district now occupied by the Afej tribes of Arabs, between the Tigris and the Euphrates, and about 100 miles southeast of Bagdad (Map: Turkey in Asia, E 4). The Talmud identifies it with Calneh (Gen. x. 10). Nippur was famous as the seat of worship of the god En-lil, or El-lil, who at a very early period acquired a unique position as the chief deity of the Babylonian pantheon. The close connection in ancient Babylonia between political supremacy and religious prominence justifies the supposition that for some time Nippur, the city of En-lil, also exercised control over a portion of the lower Euphrates valley. The religious sanctity of the place, however, outlasted its political history, and for many centuries after Nippur had yielded its political supremacy to other centres it continued to be a favorite place of pilgrimage, and the kings of both Babylonia and Assyria vied in rendering homage to the great En-lil by restoring ruined portions of his temple. The chief temple was known as Ekur (mountain house), and there was also a stage tower (*zikkurrat*), rising to a considerable height, with a shrine of En-lil at the top. Besides En-lil and his consort, Nin-lil, other gods were worshiped at Nippur, and temples or shrines were erected to them, so that there came to be a large sacred complex, shut off from the rest of the city by a double wall. It was long supposed that the name of the god of Nippur was Bel, and the inference was drawn that this city represented an Akkadian civilization; but it is now known that the god's name was pronounced En-lil or El-lil, and the Sumerian character of the early civilization of Nippur cannot be questioned.

Systematic explorations at Nippur have been conducted by the University of Pennsylvania, beginning in 1888 under the direction of the Rev. Dr. John P. Peters, the founder and organizer of the expedition, and continued at intervals till 1900. During 1893–96, and again in 1898–1900, the work was in charge of J. H. Haynes, who was joined in the field during the spring of 1900 by Prof. H. V. Hilprecht. As a result a considerable portion of the temple area and adjoining grounds has been laid bare, the character and plans of the ancient buildings have been determined, and a large number of inscriptions, historical and votive, as well as over 30,000 commercial and literary tablets, have been found. The larger number of the tablets were discovered in a section of the mound containing an edifice or edifices used for the legal and literary archives of the temple. Through the historical and votive inscriptions, of which two volumes have been published by Professor Hilprecht (*Old Babylonian Inscriptions, chiefly from Nippur*, Philadelphia, 1893–96), the history of Nippur has been traced to a date, according to Hilprecht and others, as early as c.4500 B.C. Much light has been shed on the general course of events from this early period down to the rule of the Kassites in Babylonia (1761–1185 B.C.), who appear to have been particularly attached to the cult of El-lil of Nippur. A third volume by Professors Hilprecht and Clay (*Business Documents of Murashû Sons of Nippur*, Philadelphia, 1898) consists of 120 tablets of a commercial character, illustrating business methods in Babylonia during the Persian period. Two volumes have been published by Fisher, the architect of the Babylonian expedition of 1898–1900 (*Excavations at Nippur*, part i, Philadelphia, 1905; part ii, ib., 1907). Consult, besides the works already mentioned: J. P. Peters, *Nippur, or Explorations and Adventures on the Euphrates* (2 vols., New York, 1897 et seq.); H. V. Hilprecht, *Explorations in Bible Lands during the Nineteenth Century* (Philadelphia, 1903); id., *Die Ausgrabungen in Beltempel zu Nippur* (Leipzig, 1903); id., *Die Ausgrabungen in Assyrien und Babylonien* (ib., 1904); H. V. Geere, *By Nile and Euphrates* (New York, 1904); C. S. Fisher, *Excavations at Nippur* (ib., 1905–06); Rudolf Zehnpfund, *Babylonien in seinen wichtigsten Ruinenstütten* (Leipzig, 1910); Eduard Meyer, *Geschichte des Altertums* (3d ed., Stuttgart, 1913).

NIRGUA, nēr'gwȧ. A town of the state of Yaracuy, Venezuela, 110 miles southwest of Caracas. It is situated in the richest district of the state, in a region producing coffee, cacao, sugar, tobacco, and cotton, as well as live stock. Copper, sulphur, coal, and other minerals exist in the surrounding region, and some mining is carried on. Nirgua was founded in 1554, and in 1565 rich gold deposits were discovered in the vicinity. The population is estimated at about 10,000.

NIRUKTA, nē-rụk'tȧ (Skt., explanation, from *nis*, out + *ukta*, p.p. of *vac*, to speak). The name of that one of the six *Vēdāngas* (see VĒDĀNGA) which explains difficult Vedic words. There must have been several works of this character in a remote period of Hindu antiquity, which bore the name Nirukta, for Nirukta authors are quoted either generally or by name in several Sanskrit authors; but the work which is especially called *Nirukta*, and which, thus far, is the only surviving representative of this important division of the Vēdāngas, is that of Yaska, who was a predecessor of Panini (q.v.). His work, which is divided into 12 books, consists of three parts—the *Nāighaṇṭuka*, where, for the most part, synonymous words are given; the *Nāigama*, which contains words that usually occur in the Vedas only; and the *Dāivata*, which contains words chiefly relating to deities and sacrificial acts. A commentary on this work has been composed by the same Yaska, and it likewise bears the name of Nirukta. In this, Vedic passages are quoted in illustration of the words to be explained, and the comment given by Yaska on these passages is the oldest known instance of a Vedic gloss. Besides the great importance which Yaska's *Nirukta* thus possesses for a proper understanding of the Vedic texts, it is valuable also on account of several discussions which it raises on grammatical and other questions, and on account of the insight it affords into the scientific and religious conditions of its time. It is also highly interesting as the earliest specimen of Sanskrit prose of the classical type. The text and commentary of the *Nirukta* have been edited by Roth (Göttingen, 1852) and by Samasrami, *The Nirukta, with Commentaries* (Calcutta, 1882–91; 2d ed., revised by Samakantha, 2 vols., 1911–12).

NIRVANA, nêr-vä′nȧ (Skt. *nirvāṇa*, extinction, from *nis*, out + *vāna*, a blowing, from *vā*, to blow). In Buddhistic doctrine, the term denoting final deliverance from transmigration. It implies, consequently, the last aim of Buddhism, since transmigration is tantamount to a relapse into the evils or miseries of *saṁsāra*, or the world. But, as Hinduism, or the Brahmanical doctrine, professes to lead to the same end, the difference between *nirvāṇa* and *mōkṣa*, *apavarga*, or the other terms of Brahmanism designating eternal bliss, and consequent liberation from metempsychosis (q.v.), rests on the difference of the ideas which both doctrines connect with the condition of the individual after that liberation. According to the Brahmanical doctrine, man has a soul, and Brahma being the existing and everlasting cause of the universe, eternal happiness is to the Brahmanical Hindu the absorption of the soul into that cause whence it emanated, never to depart from it again. On the other hand, as the ultimate cause of the universe, according to Buddhism, is non-entity, the deliverance from transmigration is, to the Buddhists, the return to non-entity, or the absolute extinction of individuality. Buddhism acknowledges no soul. In Brahmanism the separate soul is reabsorbed into the All-soul. In Buddhism, individuality ceases. But to some Buddhists, as also to the Jains, nirvana became a term significant rather of emancipation, eternal blissful repose. Further changes naturally followed. We are told, e.g., that nirvana is quietude and identity, whereas samsara is turmoil and variety; that nirvana is freedom from all conditions of existence, whereas samsara is birth, disease, decrepitude, and death, sin and pain, merit and demerit, virtue and vice; that nirvana is the shore of salvation for those who are in danger of being drowned in the sea of samsara; that it is the port ready to receive those who have escaped from the prison of existence, the medicine which cures all diseases, and the water which quenches the thirst of all desires. To Buddha, who received the term from earlier Hinduism and did not invent it, nirvana meant, first of all, the extinction of desire, of anger, of ignorance. Whether it was also synonymous with annihilation he refused to state, although this may be inferred.

The later Buddhistic interpretations show that it was impossible to retain the notion of a nonpsychic individuality persisting after death, and that the goal of extinction steadily faded before the older and more permanent notion of eternal felicity in one form or another. The first of these later views is that which confounds with nirvana the preparatory labor of the mind to arrive at that end, and therefore assumes that nirvana is the extinction of mentality or even of self-consciousness. The erroneousness of this view is based on the fact that the mind, even though in a state of unconsciousness, as when ceasing to think or when speculating, is still within the pale of existence. Thus, to obviate the mistaken notion that such a state is the real nirvana, Buddhistic works sometimes speak of the "nirvana without a remainder of substratum" in contradistinction to the "nirvana with a remainder," meaning by the latter expression that condition of a saint which, in consequence of his bodily and mental austerities, immediately precedes his real nirvana, but in which, nevertheless, he is still an occupant of the material world.

The second heterodox view of nirvana is that which, though acknowledging in principle the original notion of Buddhist salvation, clearly represents a compromise with popular prejudice. It belongs to a still later period of Buddhism, when this religion, in extending its conquests over Asia, had to encounter creeds which abhorred the idea of an absolute nihilism. This compromise coincides with the creation of a Buddhistic pantheon and with the classification of Buddhist saints into three classes, each of which has its own nirvana, that of the two lower degrees consisting of a vast number of years, at the end of which, however, those saints are born again, while the absolute nirvana is reserved for the highest class of saints. Hence Buddhistic salvation is then spoken of, either simply as *nirvāṇa*, the lowest, or as *parinirvāṇa*, the middle, or as *mahāparinirvāṇa*, final and absolute extinction of individuality; and as those who have not yet attained to the highest nirvana must live in the heavens of the two inferior classes of saints until they reappear in this world, their condition of nirvana is assimilated to that state of more or less material happiness which is also held out to the Brahmanical Hindu before he is completely absorbed into Brahma.

When, in its last stage, Buddhism assumes an Adi, or primitive Buddha, as the career of the universe, nirvana, then meaning the absorption into this Buddha, ceases to have any real affinity with the original Buddhistic term and becomes identified with the *mōkṣa*, or salvation by absorption, of the pantheistic philosophers. See also Buddhism; Lamaism. Consult: Hermann Oldenberg, *Buddha: His Life, his Doctrine, his Order* (Eng. trans., London, 1882; 4th ed., 1903); E. W. Hopkins, *Religions of India* (Boston, 1895); Dahlmann, *Nirvana: eine Studie zur Vorgeschichte des Buddhismus* (Berlin, 1896); Eklund, *Nirvāna, en religions historisk undersökning* (Upsala, 1899).

NI′SAN. In the Jewish calendar, the first month of the ecclesiastical year. See Abib.

NISARD, nė′zär′, Désiré (1806–88). A French literary critic and historian, born at Châtillon-sur-Seine, Côte-d'Or. Nisard began literary life as a liberal journalist. He supported the July monarchy after a brief period of vigorous radicalism as editor of *Le National* and fellow worker of Armand Carrel. In 1835 he was made Supervisor of Normal Schools, and, with official promotions, grew yearly more conservative and even reactionary. From 1842 to

1848 he was deputy, and, after temporary eclipse at the revolution of 1848, recovered under Napoleon III favor and office, which he used so servilely, in lecturing at the Collège de France, as to provoke student riots and require police protection (1855). In recompense for this he was made Commander of the Legion of Honor (1856), director of the Normal School (1857), and Senator (1867). He had belonged to the Academy since 1850. His more noteworthy works are *Histoire de la littérature française* (1844–61), *Etudes* (1859), and *Nouvelles études* (1864). Consult his *Souvenirs et notes biographiques* (2 vols., Paris, 1888).

NIS′BETT, Louisa Cranstoun (1812–58). An English actress, born in London. Under the stage name of Mordaunt, which had been used by her actor father, she appeared at Drury Lane, London, in 1829 in Andrew Cherry's *Soldier's Daughter*. She then played in *She Stoops to Conquer* and other comedies. She was married to Capt. J. A. Nisbett in 1831, but her husband was shortly afterward killed in an accident and she reappeared on the stage in 1832 in the *Soldier's Daughter*. In 1837 she played in Sheridan Knowles's *Love Chase*, one of her greatest triumphs, and four years later was the original Lady Gay Spanker in *London Assurance*. She was married to Sir William Boothby in 1844, but upon his death in 1846 again returned to the stage to play Lady Teazle and other parts, making her final appearance in 1851.

NISCEMI, nė-shä′mė. A town in the Province of Caltanissetta, Sicily, 30 miles southeast by south of the city of Caltanissetta (Map: Italy, E 6). A ruined castle is the chief object of interest. In 1790 the town suffered from an earthquake, the ground sinking in one place to the depth of 30 feet. Pop. (commune), 1901, 14,689; 1911, 15,444.

NISH, nėsh, or **NISSA**, nĭs′sȧ. The second city of Servia, situated on the Nishava, a tributary of the Morava, about 130 miles southeast of Belgrade (Map: Balkan Peninsula, D 3). It is fortified and divided into a Turkish and a Servian town. It is gradually assuming a European aspect. Its educational institutions include a Gymnasium and a training school for teachers. Situated at the junction of the Vienna-Belgrade-Constantinople and the Nish-Saloniki railway lines, as well as at the converging point of several important roads, Nish is of great commercial and strategic importance. Prior to 1901 it was the seat of the National Assembly. Pop., 1905, 21,954; 1911, 24,949, including about 2000 Mohammedans.

Nish is the Niassus of the Romans, a prominent city, according to Ptolemy, and the birthplace of Constantine the Great. In 1456 it fell into the hands of the Turks, under whom it was an important stronghold. It was the scene of a severe defeat of the Servians by the Turks in 1809, and was captured by the Servians under Milan in 1878. To Nish was temporarily transferred the seat of the Servian government on the outbreak (July, 1914) of the War in Europe (q.v.).

NISHAN EL AAMAN, nĭ-shän′ ĕl ä-män′ (Ar. *nishān al-āman*, order of the best). A Tunisian order with one class founded by Mohammed es Sadok in 1859 in commemoration of the adoption of the constitution.

NISHAN EL IFTIKHAR, ĭf′tĭ-ᴋär′ (Ar. *nishān al iftihār*, order of honor). A Tunisian order of merit, civil and military, modeled on the French Legion of Honor, founded by Ahmed Bey. It has five classes. The decoration is a star with the Bey's monogram.

NISHAN EL IFTIKHAR. A Turkish order, conferred on foreigners for services to the Turkish state. It was founded by Sultan Selim III and renewed in 1827. The decoration is an ornate medallion with the Sultan's monogram suspended from the star and crescent.

NISHAN I IMTIAS, ė ėm′tė-äs′ (Ar.-Pers. *nishān i imtiyās*, order of excellence). A Turkish order of merit conferred on civil and military officials who have displayed at least three of the qualities the names of which appear on the decoration: patriotism, zeal, bravery, and fidelity. It was founded in 1879 by Sultan Abdul Hamid.

NISHAN I SHEFKAT, ė shĕf-kät′ (Ar.-Pers. *nishān i shifqat*, order of clemency). A Turkish order with three classes, conferred on women for services in war and in times of distress. It was founded by Sultan Abdul Hamid in 1878. The decoration is a sun with laurel wreath and star suspended from a crescent.

NISHAPUR, nĭsh′ȧ-po͞or′. A town of northeast Persia, capital of the Province of Nishapur (Map: Asia, Central, H 4). It is in a fertile and populous plain 40 miles west of Meshed. Ruined walls surround it. It was formerly one of the most important cities of Persia, but has greatly declined. It still has some trade in turquoises, wool, cotton, and fruits. Pop., about 15,000. Nishapur was the birthplace of Omar Khayyam, and east of the town is the neglected tomb of the poet.

NISHGAR. See Chimesyan.

NISHINAM, nĭsh′ĭ-năm. See Maidu.

NIS′IBIS (Lat., from Gk. Νίσιβις). The capital of ancient Mygdonia, the northeastern part of Mesopotamia (Map: Turkey in Asia, D 3). It was in a fertile district and of importance both as a place of strength and an emporium of the trade between East and West, as it lay on the great roads between the Mediterranean and the Tigris. Nisibis is mentioned in the cuneiform inscriptions under the name Nasibina. It seems to have been rebuilt by Seleucus and during the Macedonian rule was known as Antiochia Mygdoniæ. It was taken in 149 B.C. by the Parthians and in their wars with Rome changed hands more than once, being captured by Lucullus (68 B.C.) and again by Trajan (116 A.D.). After its third capture by Lucius Verus (165 A.D.) it remained the chief bulwark of the Roman Empire against the Persians till it was surrendered to them by Jovian after the death of Julian in 363. Nisibin is still the name of a Turkish village near the ruins of the ancient city.

NISI PRIUS (Lat., unless before). A term applied to certain trial courts, consisting of one judge and a jury, which have jurisdiction for the trial of civil cases. The term originated in England through the practice of inserting in writs of venire (q.v.), by which jurors were summoned, a clause directing them to appear at the Court of Common Pleas at Westminster on a certain date, unless before (*nisi prius*) that time one of the judges in Eyre (circuit) should hold court in their county. It also became common, when cases from a distant county were commenced at Westminster, to fix a certain day on which they were to be tried, unless before that time court was held in that county, and this was entered on the record, being known as the *nisi prius* clause. This practice was sanctioned by the Statute of 13 Edw. I, c. 30, known as the Statute of *Nisi Prius*. The sessions held by these circuit judges came to be known as *nisi prius* courts, and this continued until after the sittings of the judges became fixed and certain, when the alternative phrase was omitted from the venire; and thereafter the use of the term as applied to the courts was gradually discontinued. To-day the cases tried before the judges of the King's Bench Division of the High Court of Justice in London are known as *nisi prius* actions, and this seems to be the only use of the term which has judicial sanction in England at present, although in the country districts the name is still popularly applied to the proceedings in the civil courts held in the various circuits under the Judicature Acts (q.v.). In a few of the United States the term is applied to certain civil courts, the sessions of which are held by judges who travel from one county to another, in a fixed circuit of several counties, during the year; but the original significance of the term has become obsolete. See CIRCUIT; COURT; JUDICATURE ACTS, and consult the authorities there referred to.

NISQUALLI, nĭz′kwȧ-lē. A Salishan tribe of North American Indians originally occupying the territory about the river of the same name at the southern end of Puget Sound, Washington. With the Puyallup (q.v.) and several smaller bands, all speaking dialects of the same language, they participated in the Medicine Creek Treaty of 1854 and were assigned to a reservation, but later were given industrial allotments and are now citizens. They subsisted chiefly upon wapatoo and camas roots, wild berries, and salmon. They lived in great communal houses of cedar planks and used cedar dugout canoes of elaborate workmanship and ornamentation. Slavery was a regular institution, and head flattening was practiced, but not scalping. They buried their dead in canoes raised upon posts. They took part in the general Indian war in Washington in 1858. They number now 137. See SALISHAN STOCK.

NIS′ROCH (Heb. *Nisrōk*). According to 2 Kings xix. 37 (Isa. xxxvii. 38), the god in whose temple Sennacherib was assassinated by his sons. No such god, however, has been discovered in the Assyrian pantheon, and the word is manifestly a corruption. As Nisroch is said to be "his god," some scholars have thought of Asur. But Sennacherib seems to have been killed in Babylon. Asurbanipal declares that at his conquest of Babylon he slew as sacrifices to his grandfather the people near the guardian deities (*Shedi u lamassi*), where Sennacherib had been killed. The assassination consequently took place in Babylon and probably at the entrance of the great Marduk temple Esagila. Since there was a Nusku chapel in that temple, the conjecture that this god is meant is not impossible. But the temple was always known as belonging to Marduk, whose name no doubt has been intentionally changed into Nisroch in the same way as Abd Nebo has been altered into Abd Nego in Dan. i. 7. Consult Winckler, in Eberhard Schrader, *Die Keilinschriften und das alte Testament* (Giessen, 1883; 3d ed., Berlin, 1902; Eng. trans., London, 1897), and A. K. Jeremias, *Das alte Testament im Lichte des alten Orients* (Leipzig, 1906).

NISSA, nĭs′sȧ. A city of Servia. See NISH.

NIS′SEN, HEINRICH (1839–1912). A German archæologist. He was born at Hadersleben, studied at Kiel and Berlin, and became professor of ancient history at Marburg (1869), Göttingen (1877), Strassburg (1879), and Bonn (1884). Nissen especially devoted himself to the critical study of early Roman history. He wrote: *Kritische Untersuchungen über die Quellen der vierten und fünften Dekade des Livius* (1863); *Das Templum* (1869); *Pompejanische Studien* (1877); *Italische Landeskunde* (vol. i, 1883; vol. ii, 1902); "Griechische und römische Metrologie" (1887), in Iwan Müller's *Handbuch der klassischen Altertumswissenschaft; Orientation: Studien zur Geschichte der Religion* (3 parts, 1906–10).

NI′SUS (Lat., from Gk. Νῖσος, *Nisos*). 1. In Greek mythology, a king of Megara, son of King Pandion of Athens, and so brother of Ægeus. His daughter Scylla fell in love with Minos (q.v.), King of Crete, when the latter, on his expedition against the Athenians to avenge the murder of his son Androgeos, besieged Megara and betrayed the city to him. She slew her father by cutting off a purple lock of hair, on the preservation of which his life and the safety of Athens both depended; but Minos punished her treachery by dragging her after his ship and drowning her. She was changed into the bird called *ciris*, in which form she was constantly pursued by Nisus, transformed into a sea eagle. The legend is treated in the extant Latin poem called *Ciris*, which passes under the name of Vergil, and by Ovid in *Met.*, viii, 1–145. Consult E. Siecke, *De Niso et Scylla in Aves Mutatis* (Berlin, 1884), and the article "Nisus," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iv (Leipzig, 1897–1909). 2. A companion of Æneas and friend of Euryalus, with whom he was slain in the war against Turnus.

NITELLA, nĭ-tĕl′ȧ. A genus of stoneworts (Charales, q.v.), usually included among the green algæ. They are found in fresh and brackish waters, attached to the muddy bottom and covering large areas with a dense mass of mosslike vegetation. *Nitella* differs from *Chara*, the other common genus, in the absence of cortical cells, which makes it a very favorable subject for observing the movements of protoplasm in the long internodal cells.

NIT′HARD (c.795–c.843). A Frankish historian, natural son of Bertha, daughter of Charles the Great. He was a warrior and a statesman and sided with Charles the Bald in the quarrels between the sons of Louis the Pious. Nithard fought in the great three days' fight at Fontenoy in 841 and died as a result of wounds received in a battle with the Northmen near Angoulême. His Latin history deals with the dissensions of the sons of Louis the Pious; it is valuable, but strongly partisan, and is remarkable as one of the few chronicles of the time written by a layman. The work is edited by Pertz (Hanover, 2d ed., 1870). Consult Wilhelm Wattenbach, *Deutschlands Geschichtsquellen*, vol. i (7th ed., Stuttgart, 1904).

NITHSDALE, nĭths′dăl, WILLIAM MAXWELL, fifth EARL OF (1676–1744). A Scottish Jacobite, the Willie of "Kenmure's up and awa'." He participated in the Jacobite rising in 1715. He was captured after the battle of Preston and was rescued from the Tower by his wife, who took his place in prison while he escaped in her clothes. He made his way to Rome, where he joined the Pretender. The Countess of Nithsdale wrote the story of his escape, published in the first volume of the *Transactions of the Society of Antiquaries of Scotland*.

NITO'CRIS (Nitaqert or Nitaqrit). The name of several queens of Egypt, of whom the best known is the last ruler of the sixth dynasty. She was sister of Menthuophis, whom she succeeded and whose murder she avenged by drowning all she suspected of connection with the plot, after having called them together for a feast. The third in size of the great pyramids was enlarged by Nitocris, and there she was buried. About her beauty legends grew up; the Greeks called her Rhodopis, translating the Egyptian epithet red-cheeked; they argued she must have been a Greek, made her a courtesan, and told how the King married her, having fallen in love with her lost slipper—the earliest form of the legend of Cinderella. Another legend in the Middle Ages, still believed in by the Arabs of the present time, makes her a beautiful spirit who haunts the pyramid and drives men mad for the love of her.

NITON, nī'tŏn (Lat., from *nitere*, to shine + *-on*, as arg*on*, etc.). A chemical element continually generated by the element radium (q.v.). It was discovered in 1900 by Dorn and called radium emanation; the name niton was applied to it by Gray and Ramsay in 1911. Niton may be obtained in small quantities by heating any radium salt, the gas given off consisting of helium (q.v.) and niton. The molecular weight of niton gas was determined by Perkins in 1908, by Debierne in 1910, and by Gray and Ramsay in 1911. All these determinations indicate the molecular weight to be 222.4. As niton is further known to be a monatomic gas (like argon, helium, and the other rare gases of the atmosphere), the atomic weight, too, is 222.4 (an atomic weight differing from that of radium by the value of the atomic weight of helium, the atom of radium being supposed to be made up of an atom of niton and an atom of helium). Niton readily liquefies at low temperatures, which permits of isolating it from its mixtures with helium. Pure liquid niton boils at —62° C. (—79.6° F.). See Radioactivity.

NITRATE OF SODA. See Manures and Manuring.

NITRATES. See Nitric Acid.

NITRE. See Saltpetre.

NI'TRIC ACID (from Neo-Lat. *nitrum*, nitre, natron, Lat. *nitrum*, from Gk. *νίτρον*, *nitron*, *λίτρον*, *litron*, natron, of Semitic origin, cf. Heb. *neter*, natron, from *nātar*, to loose), HNO_3. A powerfully acid compound of hydrogen, nitrogen, and oxygen, which was known to the Egyptians. Geber, in his *De Inventione Veritatis*, described a method of preparing the acid by heating potassium nitrate with alum and copper sulphate. Glauber was probably the first to prepare it by the action of free sulphuric acid upon saltpetre (the acid was long known as *spiritus nitri fumans Glauberi*). In 1669 Mayow described nitric acid as containing two components, one from the air and one from the earth. In 1776 Lavoisier demonstrated that one of its constituents was oxygen, and in 1785 Cavendish demonstrated the composition of the acid by synthesizing it from oxygen and nitrogen in the presence of water. However, the true composition of its molecule was not recognized until long afterward, when chemists had realized that acids in general were compounds necessarily containing hydrogen. See Chemistry.

Nitric acid does not occur in a free state in nature, but after thunderstorms traces of it are found in rain water, and, according to Boussingault, amounts of nitric acid up to 0.66 milligram to the liter have been found in the rain falling on the Alps. It occurs largely, however, combined in the form of alkaline nitrates, in Chile and elsewhere, the formation of the nitrates being supposed to originate in the putrefaction of nitrogenous organic matters; the latter are assumed to be converted into ammonia, and this to be oxidized in presence of the hydroxide of potassium, sodium, or calcium into the corresponding nitrate. (See Nitrous Acid.) Nitric acid may be made by the action of strong sulphuric acid on the nitrate of sodium or potassium, the former being generally employed on a commercial scale on account of its cheapness. Cast-iron retorts are charged with about 670 pounds of dry sodium nitrate, about 530 pounds of strong sulphuric acid are added, and heat is applied. The volatile nitric acid, on forming, passes into a series of large bottles provided with inlet and outlet tubes (Woulff's bottles) and containing small amounts of water. Nitric acid is, however, not the only product, a certain amount of peroxide of nitrogen being formed at the same time. Some of this dissolves in the nitric acid, imparting to it a more or less intense red coloration. Another portion of the peroxide is caused to come into contact with moist air, in a tower attached to the last of the large bottles, and thus this portion of the peroxide is converted into nitric acid. Sodium sulphate remains as a by-product of the process in the cast-iron retorts. The acid product generally contains about 55 per cent of nitric acid, the rest being water and small amounts of chlorine, iodic acid, oxide of iron, sulphuric acid, sodium sulphate, and peroxide of nitrogen, the nonvolatile of these impurities being carried over mechanically during the process of distillation. Most of the impurities may be readily gotten rid of by a second distillation, the first portion of the distillate and a small last portion containing nearly all the impurities, while the large intermediate portion is practically pure, although it still contains a large percentage of water and a small amount of nitrogen peroxide. A third distillation, this time after mixing the liquid with an equal volume of concentrated sulphuric acid, yields a nitric acid of over 99.5 per cent strength. To free this from peroxide of nitrogen it is gently warmed, then removed from the source of heat, and a current of dry air is passed through it until the temperature has been reduced to that of the surroundings. Thus, nitric acid may be purified for use in chemical laboratories, although even for scientific purposes a nitric acid of such strength is but very seldom used. An even purer nitric acid, approximating 100 per cent HNO_3, may be obtained by freezing the 99.5 per cent acid just described, the result being a mass of snow-white crystals that melt at —41° C. (—41.8° F.); but as soon as melted the acid undergoes some slight decomposition, and the liquid acid is again not absolutely pure. For many purposes in the arts the acid need be neither very strong nor very pure. Pure nitric acid is a colorless liquid with a specific gravity of 1.53 at ordinary temperatures. The pure acid, as well as its strong aqueous solutions, decomposes slowly under the influence of light, with formation of water, oxygen, and peroxide of nitrogen, the latter coloring the acid yellow.

A similar decomposition, only more rapid, is effected by heat, at temperatures above 86° C. (187° F.). A given amount of nitric acid may be decomposed entirely by sealing it up in a glass tube and raising the temperature to 260° C. (500° F.). Under reduced pressures nitric acid may be distilled without decomposition; thus, it may be entirely freed from nitrous acid by several distillations under a pressure of 15 millimeters of mercury, at the temperature of 45° C. (113° F.). With water, nitric acid forms two well-defined chemical compounds: a monohydrate ($HNO_3.H_2O$) and a trihydrate ($HNO_3.3H_2O$); the monohydrate melting at —38° C. (—36.4° F.), the trihydrate at —18.5° C. (—1.3° F.).

At present nitric acid is also made, on a large and increasing scale, in Norway, from the air. As far back as the latter part of the eighteenth century Priestley discovered that the nitrogen and oxygen of the air can be forced to combine to some slight extent by electric sparks. A similar effect is produced in the atmosphere by lightning, and this is why rain water invariably contains salts of nitric and nitrous acids, which are so important for the fertility of the soil. It is now known that electricity causes the union of the atmospheric elements merely by supplying the necessary heat of combination and by producing a high temperature. The primary oxide of nitrogen produced, viz., nitric oxide (NO), decomposes with *evolution* of heat; its formation, therefore, involves *absorption* of heat. But according to a general law of chemical dynamics the yield of a substance whose formation is accompanied by an absorption of heat is the greater the higher the temperature. In the case of nitrogen and oxygen only one-third of 1 per cent of a given mixture would combine at the highest temperature attained in a porcelain-baking furnace; at the much higher temperature of the electric arc the percentage yield of nitric oxide would be at least as high as 5 per cent; and at still higher temperatures the yield would presumably be still higher. On the other hand, however, at high temperatures nitric oxide also breaks up rapidly into its elements. The oxide formed at a given very high temperature would thus rapidly decompose *during cooling* until a temperature point were attained at which the decomposition is too slow to be of practical importance. In making the oxide from the elements (with the view to changing it further into nitric acid) it is, therefore, necessary to heat the air to as high a temperature as possible and immediately thereafter to cool it as rapidly as possible—a problem not easy to solve on an industrial scale. One of the earliest plants for manufacturing nitric acid from the air on this principle was established at Niagara Falls by Bradley and Lovejoy in 1902. The first successful plant was built by Birkeland and Von Eyde at Notodden, Norway, in 1903, utilizing the waterfalls, which alone can supply power cheaply enough for the purpose. At the present time hundreds of thousands of electric horse power are thus harnessed in the industry. In the Birkeland-Eyde process the flame of the electric arc used to furnish the required high temperature has the form of a disk about 6½ feet in diameter. To produce such a flame two electrodes of copper are connected with a high-tension alternator, and the ends of the electrodes are placed in the middle of a magnetic field produced by the poles of a powerful electromagnet. Through this disk flame, inclosed within the fire chamber of a furnace, air is blown at a carefully regulated speed. As soon as the air has passed the fiery zone it is cooled by contact with the refractory brick lining of the furnace to about 800° or 1000° C. (say about 1500° or 1800° F.). From the furnace it is further conducted, containing, as it now does, about 1 per cent of nitric oxide, through a series of water-cooled pipes, and thus its temperature is rapidly reduced to about 200° C. (say about 400° F.) and then more slowly to about 50° C. (122° F.). During this fall of temperature, and also subsequently, in the so-called oxidation chambers, the nitric oxide takes up more oxygen from the air with which it is mixed and turns largely into nitrogen *peroxide* (NO_2). Next the air, with its product, passes into a series of towers in which water is kept slowly flowing over broken quartz. Here most of the product is absorbed, the remainder being finally absorbed in a second series of towers, in which it is brought into contact with an aqueous solution of sodium carbonate. The water of the absorption towers changes the nitrogen peroxide mostly into nitric acid, but partly also into nitrous acid, both of which are transformed into salts, the products sent to the market being nitrate of lime, ammonium nitrate, sodium nitrite, and sodium nitrite-nitrate. Since 1909 other forms of the arc flame have come into use besides the disk flame of Birkeland and Eyde, but in principle the effect is, of course, the same. The introduction of the process just described, together with that of making ammonia (q.v.) by the direct union of nitrogen and hydrogen, definitely solved the great problem of the artificial production of nitrogenous fertilizers. See CYANAMID.

Nitric acid is used in large quantities in chemical laboratories, in both analytical and synthetic work. Its uses in the manufactures are very extensive indeed. It is used in the manufacture of explosives, of coal-tar colors, and of commercial nitrates, including those of silver, lead, iron, aluminium, barium, and strontium. A mixture of nitric and hydrochloric acids is known as aqua regia (q.v.). Nitric acid is one of the most powerful oxidizing agents and in a concentrated state readily oxidizes sulphur, phosphorus, carbon, most metals, and many organic substances. The oxidation of turpentine, e.g., when added to strong nitric acid, is rapid enough to be accompanied by an evolution of light and of heat of a very high temperature. The following may be mentioned among the *physiological effects* of nitric acid: the strong acid is a powerful caustic, staining the skin yellow and causing erosions and ulcers; even a 10 per cent solution in water will cause swelling if applied to the skin. In highly dilute form the acid is sometimes administered internally, the effect being an improved appetite and an increased secretion of urine. If continued, however, the administration of the acid will cause the gums to turn spongy and to bleed and will loosen the teeth. Whether given internally or employed in the form of baths, nitric acid will further cause dyspepsia, foul breath, headaches, debility, etc. It has been successfully given in cases of intermittent fever, to allay thirst in diabetes, and for a variety of other purposes. Externally it is used as an ingredient of gargles, in the treatment of chilblains, for the removal of warts, etc. Aqua regia is sometimes used for the same purposes as nitric acid alone. For a convenient method of detecting nitric acid, see below under *Nitrates.*

When acid potassium sulphate is heated with potassium nitrate, a fuming red liquid distills over, known as fuming nitric acid. This is really a solution of nitrogen peroxide in nitric acid and is an even more powerful oxidizing agent than nitric acid itself. Fuming nitric acid may also be prepared by mixing concentrated nitric acid with infusorial earth containing formaldehyde.

Nitrates. The salts of nitric acid, i.e., the compounds resulting from the substitution of metals for the hydrogen of nitric acid, are termed nitrates. The most important of these is ***nitrate of silver***, $AgNO_3$, which is extensively used in photography and in medicine. It is made by dissolving metallic silver in gently heated 30 per cent nitric acid, the pure salt crystallizing out on cooling. It may be purified by fusing, when the nitrates of other metals that are likely to be present are reduced and rendered insoluble, so that pure silver nitrate may be dissolved out of the fused mass on cooling. Silver nitrate is very soluble in water and dissolves in four times its weight of cold alcohol. It forms colorless tabular crystals of the rhombic system. It melts at 198° C. (388.4° F.) without decomposition; but if heated to redness it is reduced to metallic silver. Fused silver nitrate, usually in sticks rendered firm by the addition of a little potassium nitrate, or silver chloride, is used as a cauterizing agent, being commonly known as lunar caustic. When applied to the skin, silver nitrate combines with albumin to form an insoluble white albuminate of silver. When used, the sticks are moistened with water and rubbed over the surface of the skin. The nitrate is thus used in diphtheria, croup, chronic ulceration and simple inflammation of the larynx and trachea, simple chronic laryngitis, whooping cough, various forms of neuralgia, in various diseases of the eye, in erysipelas, for burns, etc. The stain left by it on the skin may be removed by the use of potassium cyanide. Internally nitrate of silver is sometimes given in certain diseases of the stomach and the heart and in bronchitis, and it has been found useful in certain diseases of the nervous system; e.g., in paralysis and epilepsy. In cases of poisoning by silver nitrate the patient should swallow a large amount of a solution of common salt, which transforms the nitrate into the insoluble and harmless silver chloride and induces vomiting; the solution of salt should be followed by moderate amounts of milk. Nitrates of lead, iron, and aluminium are used in dyeing and calico printing. ***Lead nitrate***, $Pb(NO_3)_2$, may be obtained by dissolving metallic lead, or oxide or carbonate of lead, in dilute nitric acid, the salt crystallizing out on slow evaporation. It is soluble in water, but is insoluble in strong alcohol. It is sometimes used in medicine, especially as an application for sore nipples. ***Nitrate of iron***, or ferric nitrate, $Fe_2(NO_3)_6$, is likewise sometimes used in medicine, its solution being prepared by the action of nitric acid on freshly obtained moist ferric hydroxide. ***Barium nitrate***, $Ba(NO_3)_2$, and ***strontium nitrate***, $Sr(NO_3)_2$, are used in making fireworks. The nitrates of potassium and sodium will be found described under SALTPETRE. Nitric acid and its salts may be most readily detected in solutions by the use of the alkaloid brucine: a little brucine in solution and a few drops of strong sulphuric acid are added to the liquid under examination, which turns pink if it contains nitric acid or a nitrate. The nitrates also include a number of organic substances, the most important of which are nitroglycerin and guncotton (qq.v.). See also NITROGEN.

NI'TRIFICA'TION. The term applied to the formation of nitrates in soils and manures through the agency of microörganisms. It includes three different stages, viz., (1) the transformation of organic nitrogen compounds into ammonia, (2) the conversion of ammonia into nitrites, and (3) the formation of nitrates from the nitrites. All three of these changes are due to the activity of microörganisms, the first being brought about by a variety of organisms of the putrefactive class, the most prominent being *Bacillus mycoides* and *Proteus vulgaris*, while the second and third, as Warington showed, are the work of specific organisms (*nitrosomas*, nitrous organisms, and *nitrobacteria*, nitric organisms), which have been isolated and studied with some minuteness. The retrograde action known as denitrification, by which nitrates are reduced to the less highly oxidized forms and even to free nitrogen, has also been shown to be the work of microörganisms of various kinds, some aërobic, others anaërobic. The discovery of the true nature of nitrification was made by Schloesing and Müntz in 1877. Since that date the nature of the organisms causing nitrification and the conditions best suited to their activity have been carefully studied by many other investigators. These studies have shown that the activity of the nitrifying organisms is limited by a certain range of temperature, viz., from slightly above freezing to about 50° C., the organisms being most active, according to Schloesing and Müntz, at a temperature of about 37° C. Other essential conditions are an adequate supply of air (oxygen), for which reason activity is generally confined to the surface layer of soil, suitable moisture conditions, and the presence of certain mineral plant-food constituents, especially phosphoric acid and a salifiable base (lime as carbonate).

A slightly alkaline medium is best for nitrification. Excessive alkalinity is as fatal to the process as acidity. Winogradsky, Warington, and others have demonstrated the interesting fact that the nitrifying organisms do not require organic matter, but can grow in a purely mineral medium, deriving their carbon from carbon dioxide. The nitrifying organisms are widely distributed and very abundant in all soils except such as are deficient in lime compounds and are acid. Müntz found them in abundance on the bare surfaces and in the cracks and fissures of rocks at the summits of mountains in the Pyrenees, Alps, and Vosges. They are also found in well water, river water, and sewage. As a rule they do not occur in rain or in the air. They decompose carbon dioxide and hence cause nitrification, most rapidly in the dark.

While nitrification probably goes on to some extent during the winter, the conditions are usually most favorable to rapid nitrification during the summer months. The rate is, of course, very variable. Warington found it in an unfertilized Rothamsted soil to be 1.3 pounds of nitric nitrogen per day per acre to a depth of 9 inches. Similar soil fertilized with sulphate of ammonia showed nearly twice this rate. Much higher rates than these have been reported. Nitrification is more active in cropped soils than in fallow. Ammonium salts, since they have already passed the first stage of nitrification, are considered more readily nitrifiable than organic substances which must first be converted into ammonium compounds. Müntz and Girard place them first in order of nitrifiability; then follow guano, green manures, dried blood and meat, powdered horn, poudrette, wool, and leather. Frequently, however, the rate of nitrification of ammonium salts is found to be slower than that of organic manures. This may be due to a deficiency of lime or to other unfavorable conditions. A portion of the nitrogen of soil humus is readily nitrifiable, while a part strongly resists the action of nitrifying organisms. The rate of nitrification in barnyard manure in the soil is very variable, but is probably greater than that of soil nitrogen. The old-time nitre beds or plantations were simply examples of rapid nitrification under peculiarly favorable conditions.

The constant production of nitrates in the soil and the readiness with which they are washed out in the drainage furnish a strong argument in favor of the practice of a system of cropping which keeps the soil covered with vegetation as constantly as possible. The conditions favorable to denitrification are exactly the opposite of those which favor nitrification, viz., excess (and deficiency) of water and a limited supply of air (oxygen). Under certain conditions denitrification is especially rapid in barnyard manure and results in considerable losses of nitrogen from this material.

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NITRITE OF AMYL. See Amyl Nitrite.

NITRITES. The salts of nitrous acid (q.v.).

NITROBENZENE, or Nitrobenzol, $C_6H_5NO_2$. An aromatic nitro compound manufactured from the benzene derived from coal tar and in its turn transformed into the aniline that is used in making dyestuffs. Nitrobenzene is an oily yellow liquid of specific gravity 1.2 at 0° C. (32° F.) and boiling at 205° C. (401° F.); it may be distilled without decomposition. It has a sweet taste, is insoluble in water, but dissolves freely in alcohol and ether. Its odor is very similar to that of oil of bitter almonds, which has led to its use in perfumery, under the name of essence of mirbane. Considerable quantities of nitrobenzene are transformed into benzidine by reduction in acid alcoholic solution. Most of the nitrobenzene of commerce is, however, transformed into aniline. On a large scale nitrobenzene is made by gradually adding a quantity of benzene to a mixture of concentrated nitric and sulphuric acid placed in a large iron vessel, the temperature being kept low by cooling with water, and the mixture being constantly stirred with the aid of some special arrangement with which the vessel is provided. After all the benzene has been added the temperature is raised for a short time to about 80° C. (176° F.). Then the mixture is diluted with water and distilled with a current of steam. For laboratory purposes nitrobenzene may be purified by washing with dilute soda, drying, and subjecting to a process of fractional distillation. Nitrobenzene is a very poisonous substance, its vapors, if inhaled, being capable of causing coma and death in a few hours.

NITROCELLULOSES. Cellulose occurring as cotton fibre and other natural products is found to be a carbohydrate having an alcoholic constitution, the hydrogen of whose hydroxyl (HO) groups may, through reaction with nitric acid alone or in the presence of sulphuric acid, be replaced by nitryl (NO_2) groups. Formerly, as the products of this action were thought to have a constitution analogous to nitrobenzene and other nitro-substitution compounds, they were styled nitrocelluloses, but as cellulose has the constitution of an alcohol and as the products of its nitration may be reduced again to the alcohol by the action of alkaline solutions upon them, they are now more properly styled cellulose nitrates. The empiric formula for cellulose is $C_6H_{10}O_5$. Its molecular formula is not certainly known, but is some multiple of the empiric formula. Eder believes it to be the first multiple ($C_{12}H_{20}O_{10}$) and that by the action upon it of sulphuric-nitric acid mixtures of various concentrations at different temperature and for different durations of exposure, cellulose nitrates, from the dinitrate ($C_{12}H_{18}(ONO_2)_2O_8$) to the hexanitrate ($C_{12}H_{14}(ONO_2)_6O_4$), may be formed. Vieille holds that the molecule of cellulose has twice this size ($C_{24}H_{40}O_{20}$) and that nitrates, from the tetra ($C_{24}H_{36}(ONO_2)_4O_{16}$) to the endecanitrate ($C_{24}H_{29}(ONO_2)_{11}O_9$), may be formed. Because of this confusion the formula adopted by a writer should follow the name used by him, and it renders the statement more precise to state also the N content of the substance. Cellulose nitrates are used for a great variety and widely increasing number of purposes, such as the manufacture of collodions and explosives, coating leather and incandescent gas mantles, making lacquers, moving-picture films, photographic emulsions and negative films, pyroxylin plastics, smokeless powders, and varnishes, and in waterproofing fabrics. See Explosives; Guncotton; Pyroxylin.

NI′TROGEN (from Neo-Lat. *nitrum*, nitre, natron, Lat. *nitrum* + Gk. *-γενής*, *-genês*, producing, from *γίγνεσθαι*, *gignesthai*, to become). A gaseous element discovered in 1772 by Rutherford, who found that when a small animal was allowed to breathe air in a confined space for a time, and the carbon dioxide thereby produced was removed by absorption, a gas still remained which was incapable of supporting respiration. On account of its presence in nitre, Chaptal named it nitrogen (French *nitrogène*); and owing to its incapacity for supporting life, Lavoisier named it azote (1787). It is one of the most widely distributed of the elements, and is found free in the atmosphere, of which it forms about four-fifths by volume. Considerable quantities of it occur in volcanic gases and in the air bladders of certain fishes, the bone cavities of birds, and in plants. It is likewise found in meteorites, and its presence has been demonstrated in the atmosphere of the sun. In combination it is found associated with oxygen as nitric and nitrous acids, with hydrogen as ammonia, and with oxygen, hydrogen, and carbon in many substances of organic origin. It is an essential constituent of animal and vegetable organisms, and is found in many minerals, as saltpetre and soda nitre. The separation from nitrogen of the other gases contained along with it in atmospheric air was considered a very easy matter before the discovery of argon (q.v.). In fact, the water vapor of the air can be readily removed by the use of strong sulphuric acid or burnt lime or any other good dehydrating agent; the carbonic acid of the air can be removed by means of the caustic alkalies or alkaline earths; the oxygen can be removed by passing air over red-hot copper, by burning phosphorus in the air, and by similar methods. But argon is itself an inert substance that cannot be removed by any known chemical reagent. Nitrogen might be isolated from it by liquefying the mixture and subjecting it to fractional distillation. But an easier and more certain way of obtaining pure nitrogen consists in causing it to be liberated from certain of its compounds. Thus, pure ammonium nitrite breaks up, on heating, into pure nitrogen and water. Similarly, nitrogen may be obtained by heating a mixture of potassium nitrite and ammonium chloride, or equal parts of potassium nitrite and ammonium sulphate with a mixture of three parts of water and two parts of glycerin.

Nitrogen (symbol, N; atomic weight, 14.01) is a colorless, tasteless, and odorless gas. By the application of pressure at low temperature (see CRITICAL POINT), nitrogen has been liquefied and the liquid has been caused to freeze. In the gaseous state it is slightly soluble in water. In its ordinary state it combines directly with other elements only with the greatest difficulty (see AMMONIA; NITRIC ACID), although indirectly the element can be readily made to form compounds with a large number of the elementary bodies. However, a new modification of nitrogen, described by Strutt in 1911, is comparatively very active and unites directly and readily with phosphorus, iodine, mercury, and other elements towards which nitrogen in its ordinary form is quite inert. It is possible, though by no means certain, that, while ordinary nitrogen is made up of molecules each of which contains two atoms, the new modification is monatomic, i.e., made up of molecules consisting of single atoms. Strutt found that the new modification of nitrogen was formed when the ordinary modification was submitted to the electric spark, the transformation being accompanied by a distinct luminescence which persists for a time after the discharge itself has ceased.

Nitrogen combines with oxygen to form these five oxides: 1. *Nitrogen monoxide,* or nitrous oxide, N_2O, called also laughing gas, was originally obtained by Priestley in 1772 by the action of moist iron filings on nitric oxide, NO. It is now usually prepared by the distillation of ammonium nitrate and is a colorless gas of pleasant odor and sweetish taste. It is a valuable anæsthetic (q.v.) and is largely employed for producing insensibility during short operations. It may be considered as the anhydride of hyponitrous acid (q.v.). 2. *Nitrogen dioxide,* or nitric oxide, NO, was first obtained by Van Helmont, who failed, however, to recognize it as a distinct chemical substance. Its properties have been clearly known since 1772, when Priestley succeeded in isolating it, and its composition was correctly determined by Cavendish in 1784. It is formed when various substances (hydrogen, illuminating gas, wood, coal, etc.) are burned in the air. It may be prepared by the action of cold dilute nitric acid on metallic copper (concentrated nitric acid yields laughing gas). In the absence of oxygen it remains colorless; but it readily combines with oxygen to form red fumes of nitrogen tetroxide. Still, if heated alone to 520° C. (968° F.), nitric oxide decomposes with formation of laughing gas, free nitrogen, nitrogen trioxide, and nitrogen tetroxide. Solutions of ferrous salts absorb considerable quantities of nitric oxide. 3. *Nitrogen trioxide,* N_2O_3, may be obtained by heating nitric acid with starch in a large retort, drying the gaseous product over calcium chloride, and liquefying it by means of freezing mixtures. At 10° C. (50° F.) it is a dark blue liquid and it boils below 0° C. (32° F.). Within a few degrees above that point its vapors decompose into nitric oxide and nitrogen tetroxide. The decomposition, however, is partial, and even at as high as 150° C. (302° F.) the trioxide is not yet completely decomposed. The trioxide has been recommended as a disinfectant; for this purpose a mass containing one part of sodium nitrite, two parts of acid sodium sulphate, and two parts of gypsum, is kept dry when not used; on mixing it with water it yields the trioxide of nitrogen. Nitrogen trioxide is the anhydride of nitrous acid (q.v.). 4. *Nitrogen tetroxide,* or nitrogen peroxide, has the formula N_2O_4 at lower temperatures and NO_2 at high temperatures. (See DISSOCIATION.) The tetroxide is formed when dry nitric oxide comes in contact with oxygen. It may be prepared by passing a perfectly dry mixture of two parts (by volume) of nitric oxide and one part of oxygen into a U tube immersed in a freezing mixture at —20° C. (—4° F.), and if the mixture is absolutely dry the tetroxide is thus obtained in the form of colorless crystals. Above —20° C. (—4° F.) it is usually a liquid of yellow color, the color becoming more and more intense as the temperature rises. The vapor is the more intensely colored the more it is dissociated. (See DISSOCIATION.) The boiling points of the liquid, as given by different observers, are between 22° and 28° C. (71.6° and 82.4° F.). 5. *Nitrogen pentoxide,* N_2O_5, was discovered by Sainte-Claire Deville in 1849. It may be prepared by the action of phosphorus pentoxide on nitric acid completely dehydrated by repeated distillations with sulphuric acid and freed from nitrogen trioxide by passing a current of dry air. The nitrogen pentoxide thus obtained is passed into a suitable receiver kept in a freezing mixture; when a crystalline mass has formed in the receiver, the portion remaining liquid is decanted off; then the crystals are allowed to melt, the liquid is again caused to solidify, and any portion remaining liquid is again rejected. By repeating this operation several times it is easy to obtain perfectly pure nitrogen pentoxide. The colorless rhombic crystals of this substance may be preserved very long by keeping out of contact with the air and away from light. They melt at about 30° C. (86° F.) and the liquid boils at about 45° C. (113° F.), but slightly above this temperature the substance undergoes decomposition. If exposed for some time to the light the crystals melt and may decompose with explosive violence. Nitrogen pentoxide is the anhydride of nitric acid. See NITRIC ACID.

The compounds of nitrogen with hydrogen include ammonia, NH_3, hydrazine, N_2H_4, and hydrazoic acid, N_3H. The most important of the compounds of nitrogen with the halogens is nitrogen trichloride, NCl_3, which may be considered as ammonia in which all the hydrogen has been replaced by chlorine. It is prepared by passing chlorine gas into a warm solution of ammonium chloride. It is a yellowish, volatile, extremely explosive, oily substance, which must be handled with extreme caution and the preparation of which should not be undertaken by any one not thoroughly accustomed to experimenting with dangerous substances. Its explosion may be brought about by the action of heat or light or by contact with phosphorus, turpentine, and other substances. Consult: N. V. Sidgwick, *Organic Chemistry of Nitrogen* (Oxford, 1910); Georges Claude, *Liquid Air, Oxygen, Nitrogen* (Eng. ed., trans. by H. E. P. Cottrell, Philadelphia, 1913); Joseph Knox, *Fixation of Atmospheric Nitrogen* (New York, 1914).

NITROGEN CYCLE. The cycle through which nitrogen compounds pass in nature, especially those changes occurring in wild or cultivated soils. The cycle consists in the main of nitrification, denitrification, and nitrogen fixation. The cycle is of very great significance in agriculture. A variation in the rate of the various processes determines the amount of available nitrogen for crops, and this amount in turn frequently determines yield. The great store of nitrogen in the soil is in the form of organic débris of plant and animal remains. The organic nitrogen is transformed to nitrates by the process of nitrification (q.v.). While nitrate is the form of nitrogen used by most plants, at least in well-aërated soils, there is seldom enough in the soil at any time to produce an average crop, and since a nitrate has little power to unite with soil constituents, this amount may be greatly reduced by leaching. These facts show the necessity of nitrification going on concurrently with the development of the cultural crop or natural vegetation if maximum growth of either is to occur. In general, soil conditions best for nitrification are best for the growth of most crops, i.e., good air supply, neutral or slightly alkaline reaction, and the presence of nutrient salts. Ammonium salts were thought by Liebig to be the main nitrogen source for plants, but the development of our knowledge on nitrification proved this incorrect. In experiments it has been found that ammonium salts and such organic forms of nitrogen as amino acids and amides are excellent nitrogen sources, and even alkaloids and nitrites may be used. In all of these, excepting nitrates, care must be taken to avoid toxic concentrations and injurious by-products.

In poorly aërated soil and in water deficient in oxygen, many microörganisms decompose nitrates as their source of oxygen for respiration. By many of these organisms, but not by all, the nitrogen is set free as gas and returns to the air. A second and very different type of denitrification occurs in virgin soils just after they are put under cultivation. This has been observed especially in Saskatchewan and Manitoba, but is probably a general occurrence. Leaching and anaërobic denitrification are slight in this region, so it seems that cultivation causes a rapid humus decomposition, with elimination of nitrogen. Very little is known about the denitrification in soils just put under cultivation, except the fact itself, and that the conditions for it are very different from those of anaërobic denitrification. In general, agricultural methods aim at avoiding denitrification as far as possible.

New soils geologically are poor in nitrogen. Nitrogen gradually accumulates in such soils under the natural cover of vegetation, and it is stored in the form of organic débris. The processes involved in this accumulation have received much study. In connection with this problem the amount of atmospheric nitrogen fixed by lightning and silent electrical discharge of the atmosphere has been studied. The nitric or nitrous acid thus formed is washed down by rain, used by the plant, and thereby finally added to the soil. The amount thus fixed does not make good the loss by denitrification; far less does it account for the accumulation that takes place under natural vegetation. The accumulation of nitrogen in the soil is due in the main to microörganisms, some of them free-living and others in symbiosis with higher plants. These organisms are capable of drawing upon the great storehouse of nitrogen in the air for their supply, a capacity not possessed in general by plants. The most important of free-living forms are *Clostridium pasteurianum, Azotobacter chroöcoccum, A. agilis,* and *A. vinelandia.* Two other forms, *Granulobacter* and *Radiobacter*, have much slighter power of fixation, and apparently a number of other forms are still less effective. *Clostridium* will fix nitrogen in anaërobic conditions only when associated with two bacteria generally accompanying it, but in pure culture apparently only in anaërobic condition, while *Azotobacter* acts only under anaërobic conditions. The free-living nitrogen-fixing organisms all require carbon compounds as respiratory and building material for their bodies. The presence of this carbon supply is a condition for this growth and activity. There is a more or less definite ratio between the amount of organic material used and nitrogen fixed. This varies with the organism, condition in which it acts, and the organic compound furnished. In *Azotobacter chroöcoccum*, which is a very efficient nitrogen fixer, 1–10 milligrams of nitrogen are fixed for each gram of organic material used. Algæ often furnish the necessary carbon materials in sands and other soils deficient in organic matter. *Azotobacter* disappears from soil deficient in lime carbonate, while *Clostridium* thrives even in slightly acid soils. Potassium salts and phosphates also favor the activity of *Azotobacter*. The black nitre spots of Utah and Colorado, which have proved so destructive to orchards and rendered other land nonproductive, have been attributed to the high activity of *Azotobacter*. The high activity was attributed to virulent strains, alkalinity of the soil, and other conditions favoring its growth. The color of the spots was supposed to be derived from the pigment of the organism. Others believe these nitre spots are due to water seeping from rocks rich in nitrates and evaporating at the place of the formation of nitre spots.

The organism of greatest general interest in nitrogen fixation is *Bacterium radicicola*, which lives in symbiosis with roots of various legumes. It has been known for centuries that leguminous crops enrich the soil, but it was left for Hellriegel and Wilfarth in 1888 to show that it was due to the fixation of free nitrogen by bacteria producing the nodules of the roots of these plants and present in them. Although the organism has never been obtained from the soil, it must be present in soils not demanding inoculation. Swarmers are attracted to root hairs by chemotaxis (q.v.), enter them, and pass through various stages of development in the root. These cause the development of nodules, in which they fix nitrogen for the use of the host, while drawing upon the latter for their carbohydrate supply. *B. radicicola* leads to a much greater accumulation of nitrogen in the soil than do free-living organisms, hence the great importance of leguminous plants as soil enrichers in natural vegetation and their general introduction into all crop rotations. The nitrogen added to the soil by all the nitrogen-fixing organisms is in the form of organic débris, the great storage form of soil nitrogen, and becomes available for plants generally only after nitrification.

Man is coming to play a considerable rôle in the nitrogen cycle. This is especially marked at two points. Large shipments of foods to cities lead to the drainage of great quantities of nitrogenous materials into lakes, rivers, and the ocean. The nitrogen thus removed from the land is again in part returned to the air by nitrification and denitrification, and thereby made again available for fixation. Artificial fixation of atmospheric nitrogen is now rapidly developing. The fixation as nitrates by a powerful electrical arc has not proved a full commercial success. Such a method is desirable, for it gives a form of nitrogen capable of being used in explosives as well as a fertilizer. Fixation in electrical ovens offers much more of commercial promise. In this case the products are calcium cyanide or calcium cyanamide, depending upon the temperature used. While calcium cyanamide is injurious to plants as such, it seems to be readily transformed by microörganisms in the soil, rendering it innocuous and available for green plants. It is probably transformed to nitrates. The nitrates used by various plants in making proteins, bases, and lecithin return in the main to the storehouse of organic nitrogen in the soil.

Consult: E. J. Russell, *Soil Conditions and Plant Growth* (London, 1912); id., *Fertility of the Soil* (Cambridge, 1913); also general review of recent work on nitre spots in *Botanical Gazette* (Chicago, May, 1915); and publications of the United States Bureau of Soils (Washington).

NITROGEN FILLED INCANDESCENT LAMPS. See ELECTRIC LIGHTING.

NI′TROGLYC′ERIN, $C_3H_5O_3(NO_2)_3$. An explosive substance discovered by Sobrero in 1847. Although Sobrero pointed out the possibilities of the substance as an explosive agent, it found no other than a limited use, in dilute alcoholic solution, as a remedy for headache, under the name of glonoin. Its use as an explosive remained undeveloped until 1863, when Alfred Nobel (q.v.) devised a practical method of making it on a large commercial scale. At about the same time Mowbray succeeded in manufacturing nitroglycerin on a commercial scale in Massachusetts and in safely transporting it in the frozen condition. However, the explosive did not acquire its great commercial value until Nobel, about 1866, invented *dynamite* (q.v.). Nitroglycerin is made by running from 210 to 230 pounds of pure glycerin into 1500 pounds of mixed acids, consisting of three parts by weight of concentrated sulphuric acid and two parts by weight of concentrated nitric acid. As considerable heat is set free by the reaction, it is necessary that the glycerin should be added slowly and intimately mixed with the acids. This is accomplished by dropping the glycerin into the acid mixture, stirring the whole, and cooling it by means of cold brine run through pipes which are coiled within the leaden vessel (the converter) in which the conversion is carried out. When all of the glycerin is converted into nitroglycerin, the entire charge of the converter is run into a tank, where, on standing, the nitroglycerin separates in a layer on top of the acids. The nitroglycerin is then drawn off, washed with water until nearly free from acid, then with a dilute solution of sodium carbonate until it is neutral in reaction, and then run through a filter by which it is dried.

Pure nitroglycerin is a colorless, odorless, transparent oily liquid, but as made on a commercial scale it is colored various shades of yellow. It seems probable that even in its ordinary liquid state nitroglycerin is a mixture of two isomers. Certainly two different modifications of it exist in the solid state. Of the two solid modifications one is stable and melts at 13.2° C. (55.8° F.); the second modification is labile (unstable) and melts at 2° C. (35.6° F.). The specific gravity of liquid nitroglycerin is 1.599, that of solid nitroglycerin is about 1.735. Nitroglycerin gives off vapors to a slight extent even at the ordinary temperature, but above 70° C. (158° F.) the evaporation becomes quite rapid. It is soluble in methyl alcohol, ethyl alcohol, ether, benzene, and many other organic liquids, but it is nearly insoluble in water. When the vapors of nitroglycerin are inhaled or the substance is taken into the stomach, it produces most violent headaches. Some persons are so sensitive to its action that they are poisoned when nitroglycerin touches the skin. The common antidote is black coffee. Pure nitroglycerin will keep indefinitely at common temperatures; but if continuously exposed to temperatures above 45° C. (113° F.) it undergoes decomposition, which progresses the more rapidly the higher the temperature. At 180° C. (356° F.) it explodes violently. It is also decomposed by contact with sulphuric acid or with an alkali, and decomposition due to the presence of acid has repeatedly given rise to accidental explosions. It may be exploded by percussion, concussion, or fire, but the surest and safest way of firing it is by exploding a detonator containing mercuric fulminate or lead azide in contact with it.

The name nitroglycerin, as applied to the substance discovered by Sobrero, is a misnomer and conveys a false impression as to its accepted constitution; for instead of being, as supposed when the name was given, a nitro-substitution compound, it has been shown by Berthelot to be a nitric ester, viz., the trinitrate of glyceryl (C_3H_5), a radicle forming part of the molecule of glycerin. Two other nitrates of glycerin are known, a mononitrate and a dinitrate, each with two isomers. The dinitroglycerins are liquid, the mononitroglycerins are both solid, melting, respectively, at 54° and 58° C. (129.2° and 136.4° F.).

Nitroglycerin is used directly in shooting oil wells to make them yield more freely and in blasting under water; but, as already observed, it is unsuitable for general use as an explosive. Its largest uses are in the manufacture of dynamite, blasting gelatin, and some varieties of smokeless powders, notably cordite and ballistite. Medicinally it is used in 1 per cent alcoholic solution to reduce arterial tension and relieve the heart of strain by dilating the arterioles and capillaries. Its action is similar to, though less rapid and fugacious than, that of amyl nitrite, and less persistent than that of the nitrite of sodium or potassium. It is employed in a certain type of asthma, in chorea, epilepsy, angina pectoris, and gastralgia. It has been recommended in certain forms of Bright's disease.

Bibliography. Mowbray, *Trinitro-Glycerin* (New York, 1874); Manuel Eissler, *A Handbook of Modern Explosives* (London, 1890); id., *The Modern High Explosives* (New York, 1893); P. G. Sanford, *Nitro Explosives* (2d ed., ib., 1906); Guttmann, *The Manufacture of Explosives* (ib., 1909); and also numerous original papers in the *Zeitschrift für das gesamte Schiess- und Sprengstoffwesen* (Munich, annually). See Explosives.

NITRO-HYDROCHLORIC ACID, Nitro-muriatic Acid, or Aqua Regia. See Aqua Regia.

NITROPH'ILOUS PLANTS (from Lat. *nitrum*, natron + Gk. *φίλος*, *philos*, loving, from *φιλεῖν*, *philein*, to love). Plants which thrive best in soils rich in nitrogenous materials. The term is objectionable, since it implies qualities about which there is great doubt. Certain plants found particularly in the neighborhood of manure piles have been supposed to prefer soils rich in nitrogenous substances, but the evidence upon which this is based is very slight. It is of course true that all plants require nitrogenous food, which is particularly hard to get in certain cases and especially in the case of plants which have no symbiotic fungus relation. It may be, therefore, that autophytes require larger amounts of nitrate of ammonia than do mycotrophic plants.

NI'TROUS ACID (from Lat. *nitrosus*, full of natron, from *nitrum*, natron), HNO_2. An acid compound of hydrogen, nitrogen, and oxygen, known chiefly by its salts, which are called *nitrites*. The acid itself is not known in an isolated state, being a very unstable compound, even in an aqueous solution rapidly decomposing into nitric acid and nitric oxide (NO). Nitrites, however, are very stable bodies and are usually formed by the reduction of nitrates. Traube and Biltz have shown that when a caustic soda solution containing ammonia is oxidized electrochemically, the result is a transformation of the ammonia present into nitrous acid, which combines of course with the caustic soda to form sodium nitrite; further oxidation changes this into sodium nitrate. (See Nitric Acid.) Small quantities of ammonium nitrite are found in our atmosphere, and other nitrites are contained in the juices of certain plants. In nature the nitrites are formed usually by the decomposition of organic matter, and generally indicate contamination with sewage. One of the most important nitrites is that of potassium, which is formed either by fusing potassium nitrate or by heating that salt with lead or copper.

NITROUS ETHER, or Ethyl Nitrite, $C_2H_5NO_2$. A pale-yellow liquid, lighter than water and possessing an agreeable odor of apples. On evaporation it produces a great degree of cold; it boils at 64.4° F. (18° C.), and it is very inflammable. It does not mix with water, but is readily miscible with alcohol. When kept in contact with water it soon decomposes, and an acid mixture of a very complicated character is formed. Nitrous ether is usually prepared by the action of nitric acid on alcohol. The *spirit of nitrous ether*, or *sweet spirit of nitre*, used in medicine is a mixture of nitrous ether with about four times its volume of rectified spirit. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarized antimony, in febrile affections.

NITROUS OXIDE. Nitrogen monoxide, or laughing gas, N_2O. It is made by heating solid ammonium nitrate in a flask. The result is water and nitrous oxide, $NH_4NO_3 = 2H_2O + N_2O$. Laughing gas possesses the peculiar property of intoxicating animals. It may be inhaled pure or mixed with atmospheric air for a considerable period with safety. When first inhaled there is a feeling of exhilaration experienced, which is succeeded by profound anæsthesia, during which minor surgical and dental operations may be performed. There is no resulting depression, and in cases where the inhalation is not continued over 20 minutes the patient experiences absolutely no unpleasant sensations, and on recovering consciousness is able to go about his avocations without loss of time. While nitrous oxide is the safest general anæsthetic we possess, fatalities have occurred from it, and it should not be given to elderly people with atheromatous arteries. Nitrous oxide may be given mixed with ether, but a still more satisfactory mixture is that with oxygen. A complicated apparatus and a skilled anæsthetist are necessary. Crile's investigations seem to prove that there is no lowering of phagocytosis or reduction of hæmoglobin, and that post-anæsthetic complications, such as shock, nausea, vomiting, and indicanuria, are absent or insignificant in comparison with ether anæsthesia. It is the custom in many hospitals to employ nitrous oxide as a preliminary to ether anæsthesia, in all operations requiring more than a few minutes. The term "laughing gas" is used because the patient is apt to laugh or exhibit other emotion if but a little gas is administered, and then the inhalation is intermitted. See Nitrogen.

NITTESHEIM, Agrippa von. See Agrippa von Nittesheim.

NIT'TIS, Giuseppe (or Joseph) de (1846–84). An Italian painter, etcher, and engraver, born at Barletta, Naples. He was a pupil of the Naples Academy, but found his style rather by diligent observation of nature, and in 1868 went to Paris, where he was assisted by Gérôme and Meissonier, and influenced by Manet. After exhibiting genre scenes and Italian landscapes, he devoted himself chiefly to painting outdoor scenes of Parisian life, distinguished for keen observation, refined taste, elegant drawing, and extraordinary transparency of color. Nittis excelled particularly in the rendering of atmosphere, and charmed by his exquisite types of women. His frequent studies in the open air led him gradually to a conception of nature much akin to that of the Impressionists, and from 1879 on he cultivated especially the pastel.

Later he visited London, which he interpreted no less skillfully than Paris, "Westminster" and "Cannon Street" being perhaps most representative. Good examples of his Parisian views are the "Place des Pyramides" (1876) and "Place du Carrousel" (1883), both in the Luxembourg, and the pastels "In the Bois de Boulogne" and "At the Races." Several genre scenes are in private collections in New York City and Philadelphia. Nittis's etchings and engravings are also highly valued. Consult Renan, in the *Gazette des Beaux Arts*, vol. xxx (Paris, 1884), and *Notes et souvenir de Joseph de Nittis* (ib., 1895).

NITZSCH, nĭch, Gregor Wilhelm (1790–1861). A German classical scholar, born at Wittenberg, brother of Karl Immanuel Nitzsch. From 1827 to 1852 he was professor of ancient literature at Kiel (then part of Denmark), but lost this place because of his pro-German attitude. Thereafter until 1861 he was professor at Leipzig. His publications include: *Erklärende Anmerkungen zu Homers Odyssee*, i–xii (1827–40); *Die Sagenpoesie der Griechen* (1852); *Beiträge zur Geschichte der epischen Poesie der Griechen* (1862). In these writings on Homer and the epic he held, against Wolf and Lachmann, that the *Iliad* and the *Odyssey* were each complete poems, the work of a single author, who had composed them on a uniform plan with a central dramatic idea. Consult J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

NITZSCH, Karl Immanuel (1787–1868). A German theologian, brother of Gregor Wilhelm Nitzsch. He was born at Borna, near Leipzig, Saxony. He studied for the Church at Wittenberg, where he took his degree in 1810 and where, in 1813, he became parish minister. In 1822 he was called to Bonn as ordinary professor of theology and university preacher. In 1847 he succeeded Marheineke at Berlin, and as professor, university preacher, and upper consistorial councilor he exercised with prudence and moderation a wide ecclesiastical influence. He belonged to the school, of which Neander was the chief representative, which sought to reconcile faith and science by pointing out their distinctive spheres; in theology he subordinated dogma to ethics, and became one of the leaders of the mediating theology. Besides numerous smaller treatises on dogmatics, the history of dogmas and liturgies, three larger works call for special mention: his *System der christlichen Lehre* (1829; 6th ed., 1851; Eng. trans., *System of Christian Doctrine*, Edinburgh, 1849), his *Praktische Theologie* (1847), and his *Predigten*, or sermons, of which several collections have appeared. Consult F. A. Lichtenburger, *History of German Theology in the Nineteenth Century* (Eng. trans., New York, 1889).

NIUCHWANG. See Newchwang.

NIUE, nē-ōō-ā′, or Savage Island. A coral island in the Pacific Ocean, situated about 350 miles southeast of the Samoan Islands, in lat. 19° S., long. 170° W. Area, 100 square miles. It is 220 feet high, consisting of coral limestone, and has a fertile soil. The chief export is copra. Pop., 1911, 3943, all Christians. In 1901 Niue was taken under British protection as a dependency of New Zealand.

NIVELLES, nē′vĕl′ (Flem. *Nyvel*). A town in the Province of Brabant, Belgium, on the river Thines, 18 miles south of Brussels (Map: Belgium, C 4). Its most important edifice is the Romanesque church of St. Gertrude, which dates from 1048 and contains interesting relics, among which is a quaint set of clock chimes. Nivelles has manufactures of parchment, linen, cotton, and lace, carpets, agricultural implements, art goods, furniture, and paper. There is a railway repair shop, and the town carries on an active trade in grain and live stock. It grew up around the ancient convent founded in the seventh century by the daughter of Pepin of Landen. Pop., 1900, 11,475; 1910, 12,624.

NIVERNAIS, nē′vâr′nā′. A former province in the middle of France. It was ruled in the Middle Ages by the counts of Nevers, who were succeeded by the Duke of Nevers. It is at present included almost entirely in the Department of Nièvre.

NIVÔSE, nē′vōz′ (Fr., snow month). The fourth month in the French Republican calendar. It ran from December 21 to January 19 in the years I, II, III, V, VI, and VII; from December 20 to January 20 in the years IV, VIII, IX, X, XI, and XIII; and from December 23 to January 21 in the year XII.

NIX (Ger. *Nix*, OHG. *nichus*, *nihhus*, MHG. *nickes*, *niches*, Icel. *nykr*, Dan. *nøk*, Swed. *näck*, AS. *nicor*, water-goblin; connected with Gk. *νίπτειν*, *niptein*, Skt. *nij*, to wash). The common name for all water spirits in the Teutonic mythology. They are represented as of human form of either sex, or sometimes as passing into that of a fish or of a horse. They sometimes assume the form of long-bearded old men, and at others that of golden-haired youths. They love music and dances, and possess the gift of prophecy, like the Greek muses, sirens, and other water gods. The nix taught, in return for a good gift, the art of playing on a stringed instrument; and in the evening sunshine the nixes, combing their long hair, were wont to mingle in the dances of mortals; but their company was dangerous, for, though sometimes wearing a mild appearance, they were more frequently cruel and malignant. Consult E. H. Meyer, *Mythologie der Germanen* (Strassburg, 1903).

NIX′ON, John (1733–1808). An American soldier. He was born in Philadelphia and was the son of a shipping merchant. Upon the passage of the Stamp Act, in 1765, he signed the nonimportation agreement against the Act, became active in opposing the encroachments of the English government upon American liberties, and was a member of the first committee of correspondence in Pennsylvania. In April, 1775, he became lieutenant colonel of the third battalion of the Associators, and he was also a member of the Committee of Safety. From May to July, 1776, he was in command of the defenses of the Delaware at Fort Island, after which he was put in charge of the defenses of Philadelphia. On July 8 he made the first public proclamation of the Declaration of Independence from the steps of the Philadelphia Court House. The same year Nixon was promoted colonel, and later he served under Washington at the battle of Princeton. In 1776 he became a member of the Navy Board, and two years later was with Washington again at Valley Forge. He resigned from the army in 1780 and became a director of the so-called Bank of Pennsylvania. Afterward he assisted in organizing the Bank of North America, of which he was president from 1792 till his death.

NIXON, John (1815–99). An English colliery proprietor, born at Barlow, Durham. He was educated at Dr. Bruce's Academy at Newcastle-on-Tyne, served an apprenticeship to Joseph Gray, a leading mining engineer, was an overman in Garesfield colliery in 1837–39, and then engaged in mine surveying in south Wales. Later he served as the engineer of a coal and iron company near Nantes, France. Having induced sugar refiners at Nantes, and later the French government, to use a special grade of Welsh coal, he sold it on a commission. Finally he acquired a rich coal field in the Aberdare valley. By 1897 the Nixon group of collieries produced 1,250,000 tons a year, much of their success being due to improved methods of mining, especially to Nixon's invention of the Billy Fairplay measuring machine, his introduction of the longwall system of working, and his improvements in winding and ventilating machinery.

NIXON, Lewis (1861–). An American naval architect, born in Leesburg, Va. He graduated at the United States Naval Academy in 1882, being first in his class, and was then sent to the Royal Naval College, Greenwich, England, for a three years' course in shipbuilding and naval architecture. He was appointed an assistant naval constructor in 1884, while still at Greenwich, and graduated in 1885. Nixon was superintending constructor of the navy at Cramp's shipyard and assistant constructor at the Brooklyn Navy Yard, and in 1890 designed the battleships of the *Indiana* class. These designs introduced a medium-heavy calibre for the guns of the auxiliary battery, and this eventually led to the development of the dreadnought type of battleship. When these vessels were contracted for by the Cramps of Philadelphia, Nixon became their superintending constructor, resigning from the navy. Five years afterward he left the Cramps and leased the Crescent Shipyard, Elizabeth, N. J., where, with only 400 feet of water front, he built many vessels. He became connected with many other manufacturing concerns, and in 1898 was appointed president of the New York East River Bridge Commission. In 1901 he was named head of Tammany Hall, but resigned the post in May of the next year after five months' service. He became president of the United States Shipbuilding Company of New York City in 1902. In 1914 he was appointed Commissioner of Public Works of Richmond Borough, New York City. He published *The Canal Tolls and American Shipping* (1914).

NIZA, *Sp. pron.* nē'thȧ, MARCOS, or MARCO DE, known as FRAY MARCOS (c.1495–c.1550). An Italian missionary and explorer in the service of Spain, born at Nice, whence his name. He became a Franciscan monk, was sent to America in 1531, and went first to Peru, then to Guatemala, and finally to Mexico. In 1539, under the immediate direction of Francisco Vasquez de Coronado, Governor of New Galicia, he, accompanied by a number of natives and a negro, Estevanico (or Stephen), who had been with Cabeza de Vaca on his journey across the continent, made an extended journey of exploration into the Northwest to investigate the stories told by Cabeza de Vaca. He penetrated into territory now forming part of Arizona, thus earning the title Discoverer of Arizona, by which he is sometimes known, and on his return made a report, *Descubrimiento de las siete ciudades*, in which he gives the first positive account of the Seven Cities of Cíbola and an exaggerated report of their riches. The exact route taken by Fray Marcos is not known, but it is fairly certain that he crossed Sonora and Arizona to the region of Zuñi, and that the seven cities to which he referred were the Zuñi pueblos. After his return to Mexico, Fray Marcos was made provincial of his order, and in 1540–42 accompanied Coronado in the latter's famous expedition into what is now Arizona and New Mexico, as a result of which Fray Marcos's accounts of the great wealth of Cíbola were proved to be fabulous.

NIZAMI, nē-zä'mē (1141–1203). A Persian poet, whose full name was Nizam ad Din abu Mohammed Ilyas. He was one of the canonic seven epic poets of Persia. His place of birth is uncertain; from his early home, Ganjah (now Elizavetpol), he is called Ganjavi. The poet's early years were characterized by asceticism, and his first poem, *Makhzān al-'asrār*, or "Treasury of Mysteries," is ethical in tone and strongly influenced by the Sufi poets, although it shows in the narrative parts traces of the *Shāh-Nāmah* of Firdausi. It was written about 1166, and contains, besides a good deal of introductory matter, 20 discourses dealing with theological or ethical subjects. Soon afterward he wrote *Khusrū u Shīrīn* (1176), containing some 7000 couplets, and dealing with the love of Khusru Parwiz and his rival, the architect Farhad, for Shirin, an Armenian princess (possibly an Irene of Byzantium), and the Shah's success. This romantic poem won Nizami high court favor, which, however, did not corrupt his independence. In 1188 he composed the *Dīwān*, a collection of ethical poems, which is said to have contained more than 28,000 distichs. With the old theme of Laila and Majnun (1189), a Bedouin tale of lovers separated by family feud, their brief joy on earth and their happy meeting in Paradise, the poet returned to his own field of the romantic epic. The *Iskandar-Nāmah* (1191), an account of the legendary adventures of Alexander the Great, is an attempt to rival Firdausi; its latter part is ethical and makes Alexander a searcher for truth. In 1199 Nizami wrote his great romance, the *Haft Paikār* (Seven Beauties), in which each of seven princesses tells a story. These seven princesses become the wives of Behram Gur, a Sassanian king, the hero of the romance. They symbolize the seven climes into which the habitable world is divided. Nizami died at Ganjah. His five poems called *Panj Ganj* (Five Treasures) were prototypes of several quintuples or series of five. The *Makhzān al-'asrār* was edited by Bland (London, 1844); the *Khusrū u Shīrīn* was translated by Hammer (Leipzig, 1809); the *Lailā u Majnūn* was edited at Lucknow in 1888 and translated by Atkinson (London, 1836); part of the *Haft Paikār* was edited and translated by Erdmann (Kasan, 1844); the first part of the *Iskandar-Nāmah* has been edited repeatedly, as at Lahore in 1889, and translated by Clarke (London, 1881), and in part by Rückert (Nuremberg, 1824); the second part was edited by Sprenger (Calcutta, 1852–69). Complete editions of Nizami's works have been issued at Bombay in 1834 and 1838 and at Teheran in 1845. Consult: Wilhelm Bacher, *Nizamis Leben und Werke* (Leipzig, 1872; Eng. trans. by Robinson, 1873, 1883); W. Pertsch, *Persische Handschriften* (Berlin, 1888); E. G. Browne, *Literary History of Persia* (New York, 1906).

NIZAM'S (nê-zämz′) **DOMINIONS.** A native state of south-central India. See HYDERABAD.

NIZHNI NOVGOROD, nyêzh′nyê nôv′gô-rôt. A government of Russia, consisting of 11 districts and bounded by the Government of Kostroma on the north, Viatka, Kazan, and Simbirsk on the east, Penza and Tambov on the south, and Vladimir on the west. Area, about 19,797 square miles (Map: Russia, F 3). The government is divided by the Volga and the Oka into two parts, of which the northern is low, marshy, and covered with thick forests, while the southern is more or less elevated and intersected by many river valleys. The district is watered by the Volga, the Oka, the Vetluga, and a number of small rivers, most of them navigable. The climate does not differ essentially from that of other parts of central Russia. The mean annual temperature is about 40° F. Of minerals Nizhni Novgorod has iron, alabaster, and various kinds of clay. Agriculture is the foundation of the economic life of the region. Rye and oats are the chief agricultural products. The forests cover nearly 40 per cent of the total area. In the development of the house industry the Government of Nizhni Novgorod is inferior only to few parts of Russia. In the northern section wooden articles are the chief manufactures, while in the southern part locks, knives, and other small articles of iron are manufactured. Leather and leather products are manufactured all over the district. Large numbers of the inhabitants are also engaged in navigation. The factory system is rapidly developing. The latest official enumeration gives for the government 5900 industrial establishments, employing over 22,000 persons and yielding an output of nearly $15,000,000. The chief products are flour, machinery, chemicals, leather, fruit, etc. The commerce is practically confined to the capital, Nizhni Novgorod (q.v.). Pop., 1913, 2,070,200, including a considerable number of Mordvins (q.v.) and Tatars.

NIZHNI NOVGOROD. Capital of the government of the same name and a great commercial centre of Russia, situated at the confluence of the Oka and the Volga, 273 miles east of Moscow (Map: Russia, F 3). It consists of the upper town with the kremlin, the lower town along the Oka and the Volga, and the fair grounds with the adjoining suburb on a sandy tongue formed by the confluence of the two rivers and connected by a bridge with the town proper. The upper town, situated on hilly ground, contains the principal buildings—the kremlin, surrounded by a wall dating from the sixteenth century and inclosing two cathedrals, the ancient palace now occupied by the Governor, the arsenal, and the law courts. The town has about 60 Greek Orthodox churches, a number of monasteries, a mosque, and an Armenian church. Among the ecclesiastical edifices are the church in the monastery of the Annunciation, containing a holy image of great antiquity (933), which attracts many pilgrims, the thirteenth-century cathedral of the Archangel, with a fine treasury, and the cathedral of the Transfiguration, rebuilt in 1834 and holding the tombs of the princes and princesses of Nizhni Novgorod. The chief secular buildings are the palace of the Governor, the museum of art, housed in one of the kremlin towers, and the theatre. The educational institutions include a theological seminary, an institution for the sons of noblemen, a military academy, two Gymnasia, a Realschule, and a number of special schools.

The fair to which the city chiefly owes its fame and importance was transferred to Nizhni Novgorod from Makariev (about 55 miles below the city) in 1817. The value of the merchandise brought annually to the fair averaged somewhat over $16,000,000 for the decade of 1817–26, about $96,000,000 for 1877–86, and about $89,000,000 for 1887–96. The value of the goods reaching the fair grounds in 1910 exceeded $125,000,000. The construction of railways and the general modernization of commercial methods in Russia naturally detracted from the importance of the fair. The central industrial governments of Russia are represented by their different manufactures. The fair opens in the last week of July and lasts till about the middle of September, and attracts over 100,000 merchants from every part of the Empire, while the number of visitors is estimated at 400,000.

Two distinct divisions—an inner fair and an outer fair, with some 4000 booths each—compose these extensive fair grounds, within which a splendid palace was erected in 1890. The grounds are lighted by electricity and traversed by an electric railway line. The industries of the city are comparatively unimportant, the chief products being beer, locomotives, machinery, and candles. There are a number of important financial institutions. Pop., 1904, 92,273; 1913, 109,000.

The town was founded by the Grand Prince of Suzdal, Yuri Vsevolodovitch, in 1221. It was attacked repeatedly by the Tatars and the neighboring princes and suffered much from famine and pests. It was annexed to the Principality of Moscow about the close of the fourteenth century.

NIZHNI TAGILSK, tȧ-gĭlsk′. An important mining and iron-manufacturing centre in the Government of Perm, Russia, situated in the Ural Mountains, 88 miles northwest of Ekaterinburg (Map: Russia, K 3). In the vicinity are extensive iron, copper, gold, and platinum deposits and large iron foundries and steel mills. The first iron mill in this region was founded by Nikita Demidov in 1725. Pop., 1913, 45,000.

NIZHNI TCHIRSK, chĭrsk. A Cossack settlement in the Province of the Don Cossacks, South Russia, situated on the right bank of the Don, 210 miles northeast of Novocherkask (Map: Russia, F 5). It lies in a vine-growing district and has an important annual fair lasting for 10 days. Its chief trade is in cattle, wool, and grain. Pop., 1897, 15,196; 1910, 16,300.

NJÖRD, nyẽrd. In Scandinavian mythology, the father of Frey. See ÆSIR; FREY.

NOAH, nō′ȧ (Heb. *Nŏ(a)ch*). According to the Book of Genesis, the son of Lamech, who appears in the Old Testament in a double capacity: (*a*) the chief survivor of the Deluge, which involved the destruction of all mankind (Gen. vi–ix. 17), and hence the second father of mankind; and (*b*) the first agriculturist to plant vines (Gen. ix. 20–27). According to critical scholars, in the biblical study of Noah two traditions have been connected with him and combined, the one a story of a destructive flood which came to the Hebrews from the Babylonians (see DELUGE), the other a tradition as to the beginnings of civilization, of which wine is a general symbol in the Old

Testament. This second tradition belongs to the same category as the tracing of the arts to Jabal, Jubal, and Tubal Cain (Gen. iv. 21–22) and of the building of cities to Cain (Gen. iv. 17); it is of a scholastic character, whereas the other rests upon popular mythology and legendary lore. The attachment of various originally independent stories to one and the same personage is a common phenomenon in the process of myth and legend formation. The hero of the Akkadian deluge story bears two names—Utnapishtim (source of life) and Atra-hasis or Hasis-atra (very clever, or very pious). Both names are symbolical, and it is possible that a connection with Noah appears in the character of the latter as the father of the new mankind—in this sense the source of life—and in the description of Noah (Gen. vi. 9) as *ṣaddīk tāmīm* (pious exceedingly), which is almost a literal translation of *Hasis-atra*. The names of the Sumerian hero of the flood in the versions published by Poebel in 1913 and Langdon in 1914 seem to be *Ziugiddu* and *Tugtug*, which Sayce believes to be identical with Noah in meaning. See Deluge; and consult also Langdon and Sayce, in *Proceedings of the Society for Biblical Archæology* (London, 1914).

NOAH, Book of. It has long been recognized that certain passages in Ethiopic Enoch are interpolations from a Book of Noah. Such are liv. 7–lv. 2; lx; lxv.–lxix. 25; and possibly cvi–cvii. (Charles includes vi–xi.) In Jubilees x. 13 Noah is said to have written a book concerning medicine. Whether this book actually existed when Jubilees was written, or was only assumed to exist, and whether it formed a part of the work from which the interpolations in Enoch were taken, there is no means of determining, nor is there any evidence that Jub. vii. 20 ff. are derived from it. "The Book of the Parables of Enoch" is referred to by this name in the Noachic section (lxviii. 1). This may indeed have come from the hand of the interpolator, but it is in harmony with the general impression of modern scholars, from which, however, Charles dissents and assigns the book to the pre-Maccabean period, a century before the Parables of Enoch. "The kings and mighty who possessed the earth" (lxvii. 12) can scarcely refer to any other rulers than the Roman emperors. The eruption of a volcanic mountain in the west, and the hot springs where the kings seek healing, have been very naturally interpreted as allusions to the eruption of Vesuvius in 79 A.D. and the thermal waters in the neighborhood. Origen (c. *Celsum*, v. 52) may have been familiar with a Greek version, or at any rate through some channel, with the thought of Enoch lxvii. 6, 11, 12; while he no more than any other patristic writer reveals any knowledge of the Parables of Enoch. Schmidt has suggested that the interpolations may have been made from an Ethiopic translation of the Book of Noah into the Ethiopic version of the Book of Enoch. Consult the literature quoted in the article on Enoch, Books of. See Apocrypha, *Old Testament*.

NOAH, Mordecai Manuel (1785–1851). An American Jewish journalist and politician, born in Philadelphia. While Consul General at Tunis and special agent to Algiers in 1813–19, he rescued several Americans held as slaves in the Barbary states and protested against the payment of tribute to Morocco by the United States. On his return to his own country he settled in New York (1820) and edited the *National Advocate* (a Democratic paper) and the *Courier and Enquirer*. He established the *Evening Star* in 1834, but soon withdrew from connection with the daily press and became one of the founders of the *Sunday Times*. At various times he held the offices of sheriff of New York County, surveyor of the port of New York, and a judge of the Court of Sessions. In 1820 he attempted to found a Jewish colony on Grand Island in the Niagara River. Noah wrote a number of successful dramas, and other works, including *Travels in England, France, Spain, and the Barbary States* (1819) and *Gleanings from a Gathered Harvest* (1845).

NOAH'S ARK. See Ark Shell.

NOAILLES, nô'ä'y'. A noble French family of Limousin, which dates from the eleventh century. Adrien Maurice, Duke de Noailles (1678–1766). A marshal of France, born in Paris, the eldest son of Anne Jules, Duc de Noailles (1650–1708), who was marshal also. The son bore the title of Count d'Ayen, entered the Musketeers in 1692, and served in Catalonia in 1694–95 and in Flanders in 1696–97. In 1715 the Duke entered the Council of Regency and became President of the Conseil de Finance, a post which he lost three years afterward by his opposition to Law. After 15 years of retirement he received a command under the Duke of Berwick in the War of the Polish Succession and in 1734, after his chief's death, was made marshal of France. In the same year he captured Philipsburg and in the next, at the head of the Sardinian forces, drove the Imperial army out of Italy. His last campaign was in the War of the Austrian Succession, and at Dettingen, in 1743, he was defeated. Entering the Conseil d'Etat, he took control of France's foreign policy, went to Madrid in 1746, prepared the campaigns of 1747 and 1748, and retired in 1756. His two sons, Louis (1713–93) and Philippe, Duke de Mouchy (1715–94), were also marshals of France.—Louis Marie Antoine, Viscount de Noailles (1756–1804), born in Paris, was associated with Lafayette (their wives were sisters) in the aid given to the American Colonies in their struggle for independence. He was a member of the commission which arranged for the capitulation of the British at Yorktown. In 1789, at the opening of the French States-General, he was a deputy among the nobles representing Nemours and made the memorable proposition for the abolition of titles and feudal privileges of all kinds. Marshal in 1791, he resigned during the excesses of the Jacobins and went to the United States, but returned to France as soon as the persecution of the old nobility ceased and a few years later was made brigadier general in Santo Domingo, where he died from wounds received in the capture of an English sloop of war near Havana by one of the most remarkable feats of naval daring on record.—Paul, Duke de Noailles (1802–85), joined the court of Louis Philippe in 1830. He published a *Histoire de la maison royale de Saint-Louis établie à Saint-Cyr* (1843) and a *Histoire de Mme. de Maintenon* (1848–50) and became a member of the Academy in 1849. He was a member of the House of Peers from 1827 to 1848, when he retired. His son, Jules Charles Victurnien (1826–95), devoted himself to the study of economics and published *Cent ans de république aux Etats-Unis* (1886–89). A second son of

Paul, Emmanuel Henri Victurnien, Marquis de Noailles (1830–1909), distinguished himself as a diplomat. He was born at Maintenon, Eure-et-Loire, and was educated at the Collège Bourbon. He entered the French diplomatic service in 1871 and subsequently was Minister to the United States (1872–73), first Ambassador to Italy (1873–82), and Ambassador to Turkey (1882–86) and to Germany (1896–1902). In these posts he gave proof of unusual ability.—Belonging to another branch of the family, Amblard, Viscount de Noailles (1856–), became known as an historian. He was born at Buzet. His work is largely devoted to that period of French history known as the Fronde (q.v.). He wrote: *Les Anglais en Egypte* (1898); *Marins et soldats français en Amérique pendant la guerre de l'Indépendance* (1904); *Episode de la guerre de trente ans* (1906); *Marins et soldats français* (1902–06), crowned by the French Academy; *Episodes de la guerre de trente ans: le Maréchal de Guebriant* (1912).—The Countess Mathieu de Noailles (1876–), a poet and novelist, was born in Paris. Before her marriage in 1897 to a grandson of the Duke Jules de Noailles she was the Princess Anna Elisabeth de Brancovan, a member of an old and important family. Her writings, which are emotional in the extreme and of exotic type, show the influence of De Musset and of some years spent in the Orient. They include *Le cœur innombrable* (1901), crowned by the French Academy, *L'Ombre des jours* (1902), *Les éblouissements* (1907), *Les vivants et les morts* (1913)—all poems, and the following novels: *La nouvelle espérance* (1903), *Le visage emerveillé* (1904), *La domination* (1905).

NO AM'MON. The name given to Thebes, the capital of Upper Egypt, in the Hebrew text of Nah. iii. 8. The shorter form No occurs in Jer. xlvi. 25 and Ezek. xxx. 14–16. The Greek version has *μέρος Ἄμμων* (part of Ammon) in Nahum, and elsewhere *Διόσπολις* (*Diospolis*), the common later designation of Thebes; Jerome translated *Alexandria populorum*, probably influenced by the description of the city in Nahum as "situated among the rivers having the waters round about her, whose strength was the sea and water her walls." As the Assyrians called the city Ni, and the Egyptians themselves after the twenty-first dynasty called it Nt (probably pronounced *Ne-t*, *Ne* with the feminine ending *t*; cf. early Coptic *Nĕ*), it is probable that the Hebrew consonants were also pronounced *Nĕ*. *Net* means "city." The addition of Ammon renders the reference to Thebes certain. Nahum probably thought of the capture and sack of Thebes by Asurbanipal in 663 B.C. See Thebes.

NOATAK (nō'ȧ-tăk') **RIVER.** One of the largest of the rivers of Alaska, with a drainage basin of about 8000 square miles, tributary to Kotzebue Sound. It was explored and navigated (1885, 1886) a distance of 100 miles by McLenegan and Story. Its important mineral resources, coal, copper, gold and silver, are difficult of development as it lies within the Arctic circle. There is a mission for the Eskimo at Noatak, 50 miles north of Kotzebue. Consult *United States Geological Survey, Bulletin No. 536.*

NOBBE, nŏb'be, Friedrich (1830–). A German agricultural chemist and plant physiologist, born in Bremen. He studied at Jena and Berlin, in 1861 became a professor in the Industrial School at Chemnitz and in 1868 in the Academy of Forestry and Agriculture at Tharandt. There he established, with the assistance of the Agricultural Union of Leipzig, an experiment station for plant physiology. In 1869 he inaugurated scientific seed testing, and the publication of the results of his investigations in this subject led to the system of European seed control, with its numerous stations conducted both independently and as branches of the agricultural experiment stations. Among his publications are: *Ueber die organische Leistung des Kalium in der Pflanze* (1871), with Schröder and Erdmann; *Wider den Handel mit Waldgrassamen für die Wiesenkultur* (1876); *Avena elatior* (1887); *Anträge des Ausschusses für Samenprüfungen* (1900); *Bericht des Ausschusses für Samenprüfungen* (1903–04); *Versuche über die Wechselseitige impfung verschiedener leguminosengottungen mit reinkulturen von knöllchenbakterien* (1908).

NOBEL, nō-bĕl', Alfred Bernhard (1833–96). A Swedish inventor and philanthropist. He was born Oct. 21, 1833, in Stockholm and died Dec. 10, 1896, at San Remo, Italy. As a child he went with his father (Emanuel Nobel, q.v.) to St. Petersburg, where he was educated. In 1850–54 he studied mechanical engineering in the United States as a pupil of the distinguished John Ericsson and in 1863 took out the first patent for the manufacture of an explosive composed of nitroglycerin and common gunpowder. In 1864 he was granted a second patent. The use of nitroglycerin was for a number of years attended by such serious accidents that the preparation was very widely discarded. In 1867, however, Nobel invented dynamite, or giant powder, composed of 75 per cent of nitroglycerin and 25 per cent of kieselguhr, a finely pulverized siliceous material consisting of the shells of infusoria. In 1876 the inventor patented the material known as explosive gelatin. Further inventions by Nobel—the total number reported filed in Great Britain is 129—include ballistite, a propellent which was among the earliest of modern smokeless powders, pipe lines for transporting oil long distances, and artificial gutta-percha. In 1875, by his own statement, he controlled 15 dynamite factories in various parts of the world, including those near San Francisco and New York City in the United States. Much of his experimentation in his later years was conducted in his great laboratory at San Remo, near Nice. He subscribed half the amount necessary for the equipment of the aëronaut Salomon Andrée (q.v.) for his attempt to reach the North Pole by balloon, and gave much to general charities, but is best known as the founder of the Nobel prizes (q.v.). Consult H. de Mosenthal, "The Inventor of Dynamite," in *Nineteenth Century*, vol. xliv (London, 1898), and id., "The Life Work of Alfred Nobel," in the *Journal of the Society of Chemical Industry*, vol. xviii (ib., 1899).

NOBEL, Emanuel (1801–72). A Swedish inventor and manufacturer, the father of Alfred B. Nobel, born at Gefle. Educated as an architect and machine constructor, he invented a submarine mine which, after its acceptance by the Russian government, he began to manufacture in St. Petersburg. He also built machines and devised our modern system of heating by hot water. During the Crimean War Emanuel Nobel and his son Robert (q.v.) placed Russian mines in the sea around Kronstadt and Sveaborg and built steam vessels. Dissatisfied with a new Russian ministry, the father returned to Sweden (1859). In 1862 he built a factory near Stockholm for the manufacture of nitroglycerin by an improved process. Two years later an explosion wrecked the plant and killed Emanuel's youngest son, Emil Oskar. The father and Alfred Nobel continued their experiments and manufacture on a barge anchored in Lake Mälaren (near Stockholm), the government having prohibited them to rebuild.

NOBEL, LUDVIG EMANUEL (1831–88). A Swedish inventor and manufacturer, brother of Alfred B. Nobel. He was born in Stockholm, was educated in Russia, and worked at his father's factory in St. Petersburg. (See NOBEL, EMANUEL.) Later he built his own factory for the manufacture of ammunition, much of it of his own invention and produced by machines also of his invention. During the Austro-Prussian and Franco-Prussian wars the output of his plant was very large. He also designed machinery to be used at Baku, where he was president of an oil-producing company in which his brother Robert (q.v.) was also largely interested. Under his administration this concern grew to be the greatest of its kind not only in Russia, but in the world, producing annually a billion liters and employing 13,500 men.

NOBEL, ROBERT HJALMAR (1829–96). A Swedish inventor and manufacturer, a brother of Alfred B. Nobel, born in Stockholm. He worked on explosives at his father's factory in St. Petersburg (see NOBEL, EMANUEL), later in Sweden, becoming manager of the plant controlled by his father and brother Alfred, and he also produced nitroglycerin at his own establishment in Finland. Subsequently he joined his brother Ludvig (q.v.) in the manufacture of rifles at St. Petersburg. On a visit to the Caucasus he investigated the prospects of petroleum at Baku, bought land there (1876), and eventually, through improved methods in production and transport, he and Ludvig became leaders in the oil industry.

NOBEL PRIZES, FOUNDATION, AND INSTITUTES. The will of Alfred B. Nobel (q.v.) provided for five annual prizes to be awarded to persons who, in different fields of activity, had made the greatest contributions towards the progress of the world and the welfare of humanity. The original fund, the interest of which was to be available, amounted to $9,200,000. This has been reduced several hundred thousand dollars by taxation. The prizes are divided equally among recipients for distinguished work in physics, chemistry, physiology or medicine, idealistic literature, and in the promotion of world peace. The awards in physics and chemistry are made by the Royal (Swedish) Academy of Sciences, that in physiology or medicine by the Caroline Institute (the faculty of medicine in Stockholm), that in literature by the Swedish Academy, and that in peace by a committee of five, elected by the Norwegian Storthing. Fifteen deputies elected by these bodies choose (for a two-year term) four members of the board of directors of the Nobel Foundation, a fifth member (the president) being appointed by the government. The board, which has charge of the funds of the Foundation, transfers annually to the awarding bodies the amount, usually about $200,000, to be distributed as the Nobel prizes. Each year one-tenth of the total interest is added to the capital and one-fourth deducted, largely for the Nobel Institutes. (See p. 185.) December 10,

NOBEL PRIZE WINNERS, 1901–13

	PHYSICS	CHEMISTRY	MEDICINE	[LITERATURE	PEACE
1901	W. K. Röntgen (German)	J. H. van't Hoff (German)	E. A. von Behring (German)	R. F. A. Sully-Prudhomme (French)	H. Dunant (Swiss) F. Passy (French)
1902	H. A. Lorents (Dutch) P. Zeeman (Dutch)	E. Fischer (German)	Sir R. Ross (English)	T. Mommsen (German)	E. Ducommun (Swiss) A. Gobat (Swiss)
1903	H. A. Becquerel (French) P. Curie (French) Marie Curie (French)	S. A. Arrehnius (Swedish)	N. R. Finsen (Danish)	B. Björnson (Norwegian)	Sir W. R. Cremer (English)
1904	Lord Rayleigh (English)	Sir W. Ramsay) (English)	I. P. Pavlov (Russian)	F. Mistral (French) J. Echegaray (Spanish)	Institut de Droit International
1905	P. Lenard (German)	A. von Baeyer (German)	R. Koch (German)	H. Sienkiewics (Polish)	Baroness Bertha von Suttner (Austrian)
1906	Sir J. J. Thomson (English)	H. Moissan (French)	S. Ramón y Cajal (Spanish)	G. Carducci (Italian)	T. Roosevelt (American)
1907	A. A. Michelson (American)	E. Buchner (German)	C. L. A. Laveran (French)	R. Kipling (English)	E. T. Moneta (Italian) L. Renault (French)
1908	G. Lippmann (French)	Sir E. Rutherford (English)	P. Ehrlich (German) E. Metchnikoff (French)	R. Eucken (German)	K. P. Arnoldson (Swedish) M. F. Bajer (Danish)
1909	G. Marconi (Italian) F. Braun (German)	W. Ostwald (German)	T. Kocher (Swiss)	Selma Lagerlöf (Swedish)	Baron d'Estournelles de Constant (French) A. Beernaert (Belgian)
1910	J. D. van der Waals (Dutch)	O. Wallach (German)	A. Kossel (German)	P. J. L. Heyse (German)	International Permanent Peace Bureau at Bern
1911	W. Wien (German)	Marie Curie (French)	A. Gullstrand (Swedish)	M. Maeterlinck (Belgian)	T. M. C. Asser (Dutch) A. Fried (Austrian)
1912	G. Dalén (Swedish)	V. Grignard (French) P. Sabatier (French)	A. Carrel (American)	G. Hauptmann (German)	E. Root (American)
1913	H. K. Onnes (Dutch)	A. Werner (Swiss)	C. Richet (French)	Rabindranath Tagore (Bengalese)	H. LaFontaine (Belgian)

the anniversary of Mr. Nobel's death, is the date on which awards are made. Sometimes, as will be seen from the list (p. 184), a prize has been divided among two or three persons when it seemed impossible to decide as to relative merit. Such division should not be considered to detract from the honor.

In order to further the purposes of the Foundation, provision was made by Mr. Nobel for the establishment of Institutes by the bodies intrusted with the awarding of the prizes. Three out of five had been built up to 1915: the Swedish Academy's Nobel Institute (Stockholm), with a library of some 38,000 volumes devoted especially to literary works, bibliography, and biographies of authors; the Nobel Institute for Physics and Chemistry of the Swedish Academy of Sciences (Stockholm), with a scientific library; and the Norwegian Nobel Institute, with a library devoted to law, especially international law, and to works on the peace movement. The Institutes, besides helping to choose recipients for the prizes, conduct important original researches and issue publications in their several fields. The libraries are open to the public.

Through 1913 (it was decided to announce no awards in 1914) 78 persons had received Nobel prizes, counting the cases where the prize was divided. As indicated by country of residence, rather than of birth, 18 of these were German, 16 French, 8 English, 5 Dutch, 5 Swiss, 5 Swedish, 4 American (United States), 3 each Italian and Belgian, 2 each Austrian, Danish, and Spanish, and 1 each Russian, Norwegian, Polish, and Bengalese. Further analysis gives the following results, showing the fields in which the various nations are represented: *Germany*—chemistry, 6 recipients; physics, medicine, and literature, each 4; peace, none; *France*—physics and chemistry, each 4; medicine and peace, each 3; literature, 2; *England*—chemistry, 3; physics, 2; medicine, literature, and peace, each 1; *Holland*—physics, 4; peace, 1; *Switzerland*—peace, 3; chemistry and medicine, each 1; *Sweden*—1 in each of the groups; *United States*—peace, 2; physics and medicine, each 1; *Italy*—physics, literature, and peace, each 1; *Belgium*—peace, 2; literature, 1; *Austria*—peace, 2; *Denmark*—medicine and peace, each 1; *Spain*—medicine and literature, each 1; *Russia*—medicine, 1; *Norway, Poland,* and *Bengal*—one prize each in literature. It will be noted that three women have been recipients: Madame Curie (twice), Selma Lagerlöf, and Baroness Bertha von Suttner. Two institutions have received awards. It has been asserted by the witnesses of Mr. Nobel's will that the donor's intention that unrecognized talent should be sought out and encouraged has been disregarded, in that most of the prizes have been given to those whose achievements were already widely known. Consult *Les prix Nobel,* published annually at Stockholm by the Foundation.

NOBIL′ITY (OF. *nobilite, nobilited,* Fr. *nobilité,* from Lat. *nobilitas,* nobility, from *nobilis,* noble, from *noscere,* to know; connected with Gk. *γιγνώσκειν, gignōskein,* Skt. *jñā,* to know, and ultimately with Eng. *know*). A class possessing by hereditary transmission social rank and privileges, and often political privileges as well, greater than those belonging to the mass of the people, and aristocracy of birth or privilege. In the most primitive societies, when the stronger and abler men became chiefs of tribes or clans there was frequently a body of supporters who acquired prestige from the power of their leader. The ancient empires—Egypt, Babylonia, Assyria—which had developed out of earlier tribal conditions had a noble class, priests and warriors, surrounding and upholding the throne, except when the aristocracy became too strong and ambitious and overthrew the despot who trampled on its privileges. In the empires acquired by conquest the warriors who had shared success for the conqueror became through his gratitude or his necessity a special caste, above the conquered, and handed down to their descendants the privileges they had won. In more advanced stages of society wealth or political influence have often purchased rank for their possessors, and in the highest civilization intellectual ability has been rewarded by hereditary rank. There was another type of nobility in ancient Athens and Rome, where a population early in possession retained privileges above all other comers, forming at once parties and privileged orders in the state—the eupatrids and the patricians. Among the ancient Germanic tribes class distinctions went back to the beginnings of the race, for at our first knowledge of them they were divided into nobles, freemen, and slaves. The constant warfare of centuries had effaced these distinctions to a considerable extent at the time of the Germanic invasions. The nobility of the nations of modern Europe has its origin in the feudal aristocracy. See FEUDALISM.

The Frankish Kingdom in Gaul was divided into governments, each under the authority of a chieftain called a count or *comes*—a designation derived from the *comes* of the Roman Empire—whose Teutonic equivalent was *graf,* an official of the crown in the time of Charles the Great, but acquiring in the later confusion hereditary rights. (See COUNT; GRAF.) A higher dignity and more extensive jurisprudence was conferred on the *dux* or duke (q.v.), a term also of Roman origin and implying the duty of leading the armies of the country. In the Lombard Kingdom of Italy the same term was applied to the great officers who were intrusted with the military and civil administration of cities and their surrounding provinces. The marquis (q.v.) was the guardian of the frontier marches. (See MARCH.) In the subinfeudations of the greater nobility originated a secondary sort of nobility, under the name of vavasours, castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as a knight's service, admitted them within the ranks of the aristocracy. In France the allegiance of the lesser nobles to their intermediary lord long continued a reality; in England, on the other hand, William the Conqueror obliged not only his barons, who held in fief of the crown, but their vassals also, to take an oath of fealty to himself, and his successors altogether abolished subinfeudation. (See BARON; KNIGHT.) In continental Europe the nobles, after the tenth century, assumed territorial names from their castles or the principal town or village on their demesne; hence the prefix *de,* or its German equivalent *von,* still considered over a great part of the Continent as the criterion of nobility or gentility. In England, on the contrary, many of the most distinguished family names of the aristocracy had no territorial origin. In the later Carolingian Empire the powerful nobles encroached more and more on the royal authority, and in course of time many of them openly asserted an independence and sovereignty with little more than a nominal reservation of superiority to the King. By the end of the ninth century the Empire had been parceled into separate and independent principalities, under the dominion of powerful nobles. During the entire history of the Holy Roman Empire the crown never succeeded in vindicating its power against the feudal princes. In France the royal authority gradually revived under the Capetians, the great fiefs of the higher nobility being one by one absorbed by the crown. In England the resistance of the nobles to royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held in capite from William belonged to the nobility. Such of them as held by barony (the highest form of tenure) are enumerated in Domesday. Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates, and these were in England the only names of dignity till the time of Henry III. The rest of the landholders, who held by other tenures than barony, also belonged to the nobility or gentry.

After the introduction of heraldry and its reduction to a system the possession of a coat of arms was a recognized distinction between the noble and the plebeian. On the Continent the term "noble" still generally refers to those to whom or their ancestors arms have been granted. In England it is now more common to restrict the words "noble" and "nobility" to the five ranks of the peerage constituting the greater nobility and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the nobility of continental countries.

The higher nobility, or nobility in the exclusive sense, of England consists of the five temporal ranks of the peerage—duke, marquis, earl, viscount, and baron (in the restricted signification of the word), who are members of the Upper House of Parliament. See Parliament.

The once powerful feudal nobility of France had been reduced in the time of Louis XIV to a mere aristocracy of courtiers through the steady growth of the royal power. Immediately before the Revolution 80,000 families claimed nobility, many of them of obscure station and less than 3000 of ancient lineage. The Revolution overthrew all distinction of rank. On June 18, 1790, the National Assembly decreed that hereditary nobility was an institution incompatible with a free state and that titles, arms, and liveries should be abolished. Two years later the records of the nobility were burned. A new nobility was created by the Emperor Napoleon I in 1808, with titles descending to the eldest son. The old nobility was revived at the Restoration. All marquises and viscounts are of pre-Revolution titles, none having been created in later times.

Commercial pursuits have in different countries been considered more or less incompatible with nobility. In England this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. In England, on the other hand, the landed aristocracy was in close alliance with the plutocracy or the moneyed middle classes from the beginning of the development of trade, but especially after the seventeenth century. A sort of commercial Bürger-Adel, or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nüremberg, and Frankfort, on whom the emperors bestowed coats of arms. (See Fugger; Welser.) In semifeudal Italy there was on the whole less antagonism between nobility and trade than north of the Alps. The aristocracy of Venice had its origin in commerce, and, though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Florence in the fourteenth century, under a constitution purely mercantile, nobility became a disqualification from holding any office of the state. In order to be admitted to the enjoyment of political honors the nobleman had to be struck off the rolls of nobility, and an unpopular plebeian was sometimes ennobled in order to disfranchise him. A little later there grew up, side by side with the old nobility, a race of plebeian nobles—as the Ricci, the Medici—whose pretensions were originally derived from wealth and who eventually came to be regarded as aristocrats by the democratic party.

In Spain the term *hidalgo* (*hijo d'algo*, son of somebody, not *filius nullius*) indicates nobility. The hidalgo alone has in strictness a right to the title *don*, which, like *sir* of the *British* knights and baronets, requires the adjunct of the Christian name. When the Christian name is omitted, the title *señor* instead is prefixed with the addition of *de*. Members of the higher nobility bear the title *grandee* (q.v.); formerly the title was *rico-hombre*, and the ceremonial of creation consisted in granting the right of assuming the pennon and caldron (*peñón y caldera*)—the one the rallying ensign of command, the other of maintenance of followers. In contradistinction to the grandees, the class of nobility below them are called *los titulados de Castilla*.

In Russia what nobility existed before Peter the Great was of a patriarchal, not a feudal, kind (see Boyar); but in his anxiety to assimilate everything to a Western standard, the Czar took the existing aristocracies of states quite differently situated as the model to which to approximate the fortunate of his own subjects.

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NOBLE, nō'b'l, Alfred (1844–1914). An American civil engineer, born at Livonia, Mich., Aug. 7, 1844. He served during the Civil War in the Army of the Potomac (1862–65), and graduated at the University of Michigan in 1870. For 12 years he was in local charge of the improvements of the St. Mary's Falls Canal and St. Mary's River between lakes Superior and Huron, during the construction of the Soo canal lock, at that time the largest canal lock in the world. From 1882 he devoted his attention to bridge engineering. He was resident engineer of the Washington Bridge, New York City, the Cairo (Ill.) Bridge over the Mississippi; and assistant chief engineer of the bridges over the Missouri at West Alton (Mo.) and Leavenworth (Kans.) and over the Mississippi at Alton (Ill.). In 1895 he was appointed a member of the Nicaragua Canal Board; from 1897 to 1900 was a member of the United States Board of Engineers of Deep Waterways, to make surveys and prepare plans and estimates in connection with a ship-canal route from the Great Lakes to the Atlantic seaboard; and from 1899 to 1903 was on the Isthmian Canal Commission. A member (1905) of the International Board of Consulting Engineers of the Panama Canal, consisting of five foreign and eight American engineers, Noble, with four other American engineers, made a strong stand for a lock canal, and their advice was accepted by the Federal government, although all the foreign and three of the American engineers advised a sea-level canal. Noble was chief engineer of the East River division of the Pennsylvania tunnel and terminal improvements, New York City (1902–09), and consulting engineer of many great works, including the Galveston sea wall (built after the tidal wave flood of 1900) and the New York Rapid Transit subways. He contributed papers to the *Proceedings* of the Chicago Academy of Sciences and of the Western and American Societies of Civil Engineers. At various times he served as president of the Western Society of Engineers (1897), the American Society of Civil Engineers (1903), and the American Institute of Consulting Engineers (1913). In 1910 he was awarded the John Fritz medal for "notable achievements as a civil engineer" and in 1912 he received the Cresson medal of the Franklin Institute. At his death (April 19, 1914) he held a position in the front rank of American civil engineers, both professionally and as a personal counselor and friend.

NOBLE, Sir Andrew (1831–1915). A Scottish physicist and artillerist, born at Greenock and educated at the Edinburgh Academy and the Royal Military Academy, Woolwich. In 1858 he was appointed secretary to the Committee on Rifled Cannon and to the Plates and Guns Committee in 1859, when he was also made assistant inspector of artillery. In 1860 he left the public service to enter that of Sir W. G. Armstrong & Co., at the Elswick Arsenal. There he had wider opportunities for experimental research, and his invention of the chronoscope in 1862, which made possible the measurement of the initial velocity produced by various powders, led to an increase in the substitution of rifles for smoothbores. Eventually he became chairman of Sir W. G. Armstrong, Whitworth & Co., Ltd. In 1900 Noble was a member of the committee appointed by the government to inquire into the properties of smokeless powder. Besides numerous foreign honors, he received the royal medal of the Royal Society (1880), the gold medal of the Society of Chemical Industry (1908), and the Albert medal of the Royal Society of Arts (1909); was given honorary degrees by Oxford and Cambridge; received the K.C.B. in 1893; and was made Baronet in 1902. He published, besides papers, pamphlets, and lectures, *Artillery and Explosives* (1906).

NOBLE, Eugene Allen (1865–). An American college president, born in Brooklyn. He graduated from Wesleyan University (Connecticut) in 1891 and studied at Garrett Biblical Institute (Illinois). Ordained to the Methodist Episcopal ministry, he was pastor at Bridgeport, Conn., in 1891–95, and at Brooklyn in 1895–97. From 1897 to 1902 he was superintendent of the Seney Hospital, Brooklyn, and for the next six years he held the headmastership of the Centenary Collegiate Institute at Hackettstown, N. J. He served as president of Goucher College, Baltimore, in 1908–11, and thenceforth as president of Dickinson College (Pennsylvania).

NOBLE, Frederick Alphonso (1832–). An American Congregational clergyman, born at Baldwin, Me. He graduated at Yale in 1858 and studied at Andover (1858–60) and Lane (1861) theological seminaries. His first pastoral charge was in St. Paul, Minn., where he remained for six years. After occupying pulpits in Pittsburgh (1868–75) and in New Haven, Conn. (1875–79), he was minister of the Union Park Church, Chicago, until his retirement in 1901. He was editor of the *Advance* (1886–88), served as moderator of the National Council of Congregational Churches (1898), and was president of the American Missionary Association (1898–1900). His publications include: *Divine Life in Man* (1896); *Discourses on Philippians* (1897); *Our Redemption* (1898); *Typical New Testament Conversions* (1901); *The Pilgrims* (1907).

NOBLE, John Willock (1831–1912). An American lawyer and cabinet officer, born at Lancaster, Ohio. After a year at Miami University, he entered Yale, where he graduated in 1851. He then studied law at Columbus and Cincinnati, finally in the office of Henry Stanbery; removed to St. Louis in 1855; and a year later settled in the practice of his profession at Keokuk, Iowa. There he took part in politics, and in 1859–60 was city attorney. In 1861 he enlisted in the Third Iowa Volunteer Cavalry as a private, gradually rose to the rank of colonel, and was brevetted brigadier general at the close of the war. Settling again at St. Louis after the war, he was United States district attorney for the eastern district of Missouri from 1867 to 1870. Impressed by his vigorous prosecution of the whisky and tobacco frauds, President Grant offered him the post of Solicitor-General, but he declined in order to continue his private practice. He was Secretary of the Interior in the cabinet of President Harrison from 1889 to 1893, after which he resumed law practice in St. Louis. As Secretary, he had difficult questions to decide relative to the opening of Indian lands to settlement and the organization of Oklahoma Territory.

NOBLESVILLE, nō′b'lz-vĭl. A city and the county seat of Hamilton Co., Ind., 22 miles north by east of Indianapolis, on the White River and on the Central Indiana and the Lake Erie and Western railroads (Map: Indiana, F 4). Among its industrial establishments are a strawboard mill, foundries, enameling works, carbon works, flouring mills, grain elevators, carriage factories, etc. Among the prominent structures are the Hamilton County Hospital, Carnegie library, high school, and courthouse. Settled in 1824, Noblesville was incorporated first in 1839. The government is administered under a charter of 1890, which provides for a mayor, elected every four years, and a unicameral council. Pop., 1900, 4792; 1910, 5073.

NO-BODY CRAB, or SEA SPIDER. See PANTOPODA.

NOBUNAGA, nō′bōō-nä′gȧ (1533–82). A Japanese soldier and ruler, who brought order out of anarchy in the latter half of the sixteenth century. Born of an humble family, he was free from the hatreds and jealousies of the nobles, and won his way by his own powers as an intrepid and skillful soldier. He was victorious in many contests, and, notably, he humbled the militant Buddhist priests, destroying two strongly fortified monasteries and putting the monks to the sword. Buddhism never regained its political power. As an aid in the contest with Buddhism he welcomed the Jesuit missionaries, his own son becoming a Christian. But his favor was wholly for political purposes. Nobunaga was a jovial, pleasure-loving man, a patron of the fine arts and of wrestling. His private life was stained not only by the vices common to the military men of his age, but by treachery. In consequence of his failure to respect a pledge given by one of his lieutenants, he was assassinated, his murder being speedily avenged. In a desperate age Nobunaga began the work which was carried to its completion by his greater successors, Hideyoshi (q.v.) and Iyeyasu (q.v.). Consult Frank Brinkley, *Japan* (Boston, 1901), and W. E. Griffis, *The Mikado's Empire* (12th ed., New York, 1913).

NOCERA DE' PAGANI, nō-chā′rȧ dā pȧ-gä′nē. A city in Italy. See NOCERA INFERIORE.

NOCERA INFERIORE, ĕn′fā-rē-ō′rā, or NOCERA DE' PAGANI. An episcopal city in the Province of Salerno, Italy, 20 miles east-southeast of Naples by rail (Map: Italy, E 4). It has a cathedral, ruins of a castle formerly an Angevine stronghold, and large modern factories of linen and woolen goods. The town was the ancient Nuceria Alfaterna, destroyed by Hannibal in 216 B.C., but rebuilt by Augustus. It is the birthplace of Hugo de' Pagani, founder of the Templars, and the painter, Francesco Solimena. Pop. (commune), 1901, 19,796; 1911, 22,368.

NOC′TES AM′BROSIA′NÆ (Lat., ambrosial nights). The name of a long series of critical, political, and poetical disquisitions in dialogue published in *Blackwood's Magazine* from 1822 to 1835, purporting to be the word-for-word report of the meetings at Ambrose's Tavern, Edinburgh, and elsewhere, of several of the literary celebrities of the day. For the first three years they were the work of many hands, but after 1825 they were mostly by Christopher North (John Wilson, q.v.). The scheme was evidently taken from the symposia of the ancients. The *Noctes* had an immense vogue, but they are now little read. Their great creation is the character of the Ettrick Shepherd, an idealized portrait of James Hogg (q.v.).

NOCTILU′CA (Lat., that which shines by night). An enormous monad-like form representing the order Cystoflagellata, of the class Mastigophora (q.v.). It is a highly phosphorescent organism, so small as to be scarcely seen with the naked eye, being from ¼ to 1 mm. (0.01 to 0.04 inch) in diameter, and occurs in great numbers on the surface of the sea, including American harbors. It has a nearly spherical, jelly-like body, with a groove on one side, from which issues a curved filament or flagellum, used in locomotion. Near the base of this flagellum is the mouth, having on one side a toothlike projection. Connecting with the mouth is a short œsophagus or gullet, which passes into the digestive cavity, in front of which lies a nucleus. Beneath the outer skin or firm membrane surrounding the body is a gelatinous layer, containing numerous granules. The young result from a division or segmentation of the entire mass of the protoplasm of the body, forming small oval bodies with a long lash. The germs or zoöspores are somewhat like those of other flagellate infusoria, but very unlike the adult.

The only other representative of this order is *Leptodiscus medusoides*, which darts through the water by the contractions of its umbrella-shaped body. It was discovered at Messina, but has not yet been detected in American waters.

NOCTU′IDÆ (Neo-Lat. nom. pl., from Lat. *noctua*, night owl, from *nox*, night). A large and important family of moths, containing all of those forms known as owlet moths (q.v.). Their larvæ include the cutworms. See CUTWORM.

NOCTURNE, nŏk-tûrn′ (Fr., night piece). The name given by John Field (q.v.) to a composition of a soft, dreamy character somewhat free in form. The greatest master of the nocturne is Chopin, who has filled this form with the loftiest contents.

NOD. The name of the land where Cain dwelt after he had gone forth from the presence of Yahwe, according to Gen. iv. 16. It has sometimes been translated 'wandering,' and the phrase, "he dwelt in the land of wandering," has been understood as a poetical expression for "he was a nomad." But Sayce (*Expository Times*, June, 1911) has pointed out that, since Cain not only dwelt in the land of Nod, but also built a city there, "*nadh* (wanderer) would seem to be derived from an etymological play on the name of Nod"; and, as he assumes a Babylonian origin of the story, thinks that the country referred to lay east of Babylonia, which, in his opinion, was "the land of Yahu." Cain, however, seems to represent the Kenites, and

Nod (or Naid, as the Greek version reads) may very well be the name of the country where this people actually dwelt. That was a district in the Negeb, as is evident from 1 Sam. xxvii. 10, east of the Jerahmeelite Negeb, and consequently just west of the southern end of the Dead Sea and the Arabah (q.v.), where Kenite names still seem to survive. Instead of "east of Eden" the original text may have read "east of the *adamah*" (settled land). Consult Nathaniel Schmidt, *The Messages of the Poets* (New York, 1911). See CAIN; JERAHMEEL; KENITES; NEGEB.

NODAL POINTS. See NODE.

NOD'DY (probably from *nod*, OHG. *hnoton*, *nuoton*, dialectic Ger. *notteln*, to shake). A brownish-black tern (*Anous stolidus*), widely diffused in both hemispheres, and familiar to sailors, as it not infrequently alights on vessels and suffers itself to be taken by the hand. At its breeding places also, where not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest; hence it commonly shares with the booby the reputation of unusual stupidity. The noddy is rare in the North Atlantic, but very abundant in warmer latitudes, and on some of the keys of the West Indies breeds in immense numbers, and the eggs are collected as food.

NODE (from Fr. *node*, from Lat. *nodus*, knot). A small, circumscribed protuberance or swelling which when occurring upon the surfaces of the bones of the head and extremities is nearly always due to syphilis. Another variety of node occurs in one form of arthritis deformans and is called Heberden's *nodosities*. These bony tubercles appear upon the dorsal and lateral surfaces of the terminal phalanges of the fingers and are incurable. They are most common in women and neurotic persons.

NODE. An astronomical term used in connection with planetary orbits. If we disregard certain small perturbations (q.v.) of planetary motion, we may say that each planet moves in an elliptic curve, having the sun in one of its foci. This curve lies in a plane called the plane of the orbit; and in the case of the earth this orbital plane is called the plane of the ecliptic. Now, if these orbital planes are imagined extended to the celestial sphere, they will cut out upon it great circles. The great circle cut out by the plane of the earth's orbit is called the ecliptic (q.v.). If we consider the ecliptic and the corresponding great circle belonging to any other planet, we shall find that they intersect at two points on opposite sides of the celestial sphere. These two points, in the case of any planet other than the earth, are called the *nodes* of its orbit.

Thus, all the planetary nodes lie on the ecliptic circle; and the position of any node is given by stating its celestial longitude. (See LATITUDE AND LONGITUDE.) This longitude of the node is one of the elements (q.v.) of a planet's orbit. Since the two nodes are directly opposite each other, their longitudes must differ by exactly 180°, so that the longitude of one being given, that of the other is known also. By common consent, astronomers select the *ascending* node as the node whose longitude is to be given as an element of the orbit. This is the node corresponding to the passage of the planet from the south side of the ecliptic to the north side. The other node is called the *descending* node.

The effect of planetary perturbations (q.v.) is to cause the nodes to move backward on the ecliptic. The rate of motion is very slow, the most rapid being in the case of Uranus, whose node will travel once around the ecliptic in 37,000 years, while that of Mercury will consume 166,000 years in a single revolution.

NODE, NODAL POINTS. When a string or metallic cord, under strong tension, is made to vibrate, there are heard besides the principal sound secondary and shriller sounds, which are denominated overtones or harmonic sounds and are produced by a certain portion of the cord vibrating independently. Investigation shows that every vibrating string is divided into a number of segments vibrating independently, and that the points which separate these portions from each other are at rest. These points are known as *nodal points*, and their situation may be found by placing small pieces of paper on a stretched string and causing it to vibrate. When a string vibrating to its fundamental note, i.e., as a unit, is touched at its middle point with a feather, it will immediately resolve itself into segments of equal length vibrating twice as rapidly. The point where the string is touched with the feather, being at rest, would accordingly form a node, while the vibrating portions would be known as ventral segments. Chladni discovered that if a plate of glass or metal be clamped at the centre and then be touched by the finger at some middle point on one of the sides, and a well-resined fiddle bow be drawn across the edge, particles of fine dust or sand previously placed on the plate will arrange themselves in lines, showing that along these lines no vibration has taken place; these lines are *nodal lines*, and are found in most cases to group themselves together into geometrical figures, and occasionally to present the most beautiful designs. (See CHLADNI FIGURES.) The arrangement of the nodal lines depends on the point at which the plate is touched and on the form of the plate itself. Similarly, a column of air vibrating in an open or closed organ pipe will divide itself into portions each in a state of vibration and separated from one another by transverse sectional portions in which the air is at rest; these latter sections are known as *nodal sections*. In the open pipe the node is at the centre of the pipe, while in the closed pipe the node is at the end. See ACOUSTICS.

NO'DIAK (Papuan name). The Papuan spiny ant-eater. See ECHIDNA.

NODIER, nô'dyâ', CHARLES (1780–1844). A French philologist, novelist, poet, and critic, born at Besançon, April 29, 1780. He studied at Strassburg. In 1802 he published *Stella ou les proscrits*, a novel after the manner of Rousseau, and in 1803 *Le peintre de Salzbourg*, inspired by Goethe's *Werther*. In 1804 appeared *Essais d'un jeune barde;* in 1815 the *Histoire des sociétés secrètes de l'armée. Trilby ou le Lutin d'Argail* came out in 1822, and the Romantic school began to gather about Nodier in the salon of the Arsenal towards 1823. Nodier, like most of the romantic writers, is in love with the sensational, exotic, and fantastic, and is fond of turning history into romance. In 1830 he put forth the *Roi de Bohême et ses sept châteaux*, and in 1832 *La fée aux miettes*, a fairy tale. In 1834 he became an Academician, 10 years after he had been made director of the Library of the Arsenal. He died in Paris, Jan.

26, 1844. Nodier outgrew his sentimentalism, and became, through his *Jean Sbogar* (1818), *Rutwen* (1820), *Smarra* (1821), and *Trilby*, the herald of romantic fiction in France. *Bertram ou le château de Saint-Aldebrand*, a tragedy, shows English influence, particularly that of Sir Walter Scott. His versatility is shown by his publication in 1808 of a *Dictionnaire raisonné des onomatopées* (2d ed., 1828) and by his *Dictionnaire universel de la langue française* (1823). An edition in 12 volumes of his *Œuvres* appeared in 1832–34. Consult Madame Menessier-Nodier, *Charles Nodier, épisodes et souvenirs de sa vie* (Paris, 1867), and George Brandes, *Main Currents in Nineteenth Century Literature*, vol. v (new ed., New York, 1906).

NOD′ULAR DISEASE (from Lat. *nodulus*, dim. of *nodus*, joint). A disease due to the presence of a roundworm (*Œsophagostoma columbianum*) in the intestinal walls of sheep, which has often been mistaken for tuberculosis of the intestines. Positive diagnosis can be made only after death. Affected animals become anæmic and debilitated, the wool becomes dry, and there may be profuse diarrhœa. The larger tumors will be found to contain the small nematode worm, surrounded by a greenish, cheesy mass. The adult worm is found free in the large intestine. Treatment is confined to a forced nutrition of the patients.

NODZU, nŏd′zo͞o, Michitsura, Count (1840–1908). A Japanese soldier, born in Satsuma of a Samurai family. He was a colonel of the Imperial army in the civil war of 1877, became lieutenant general in 1885, and general in 1894, and at the head of the Hiroshima division contributed greatly to the victory over the Chinese at Ping-Yang in September of that year. He succeeded Marshal Yamagata as commander of the First Army. He was subsequently inspector general of education. In 1904, at the opening of the Russo-Japanese War (q.v.), he received command of the Fourth or Tai Kushan Army, and subsequently he had an important part in the great battles of Liao-Yang, the Sha River, and Mukden. Nodzu was created Count in 1895, and was made Marquis and field marshal for his services in Manchuria.

NOÉ, nō′ā′, Amadée de. See Cham.

NOEGGERATH, nĕg′ĕ-rāt, Emil Jacob (1827–95). A German gynecologist. Born at Bonn, where he received his education (M.D., 1855), he came to the United States in 1856, and settling in New York City became professor of obstetrics and gynecology at Bellevue Hospital Medical College. In 1885 he retired and returned to Germany to live in Wiesbaden, where he died. Noeggerath was one of the first to emphasize the importance of latent gonorrhœa in women (1872), and he proposed a new method in ovariotomy. Among his writings are: *Contributions to Midwifery, etc.*, with Abraham Jacobi (1859); *Beiträge zur Struktur und Entwicklung des Carcinoms* (1892). From 1868 to 1871 he was co-editor of the *American Journal of Obstetrics* (New York), which he founded in the former year with Dr. Jacobi.

NOEL, nō′ĕl, Baptist Wriothesley (1798–1873). An English clergyman. He was born at Leightmount, Scotland, and was educated at Westminster School and at Trinity College, Cambridge. He studied first for the bar, but abandoned this profession for the Church of England. In 1827 Noel was appointed minister of St. John's Chapel, Bedford Row, London, where his forceful eloquence won him a place of leadership among the preachers of evangelical tendencies. In 1846 he assisted in organizing the Evangelical Alliance. During the Gorham controversy (q.v.) of 1848–50, Noel became deeply convinced that the union between church and state was prejudicial to religion. He withdrew from the Established church and entered the Baptist denomination, at the same time publishing his grounds for so doing in an *Essay on the Union of Church and State* (1848). Later he published an *Essay on the Act of Baptism* (1850). He was president of the Baptist Union in 1855 and 1867. Noel warmly espoused the Northern side during the Civil War, and made a permanent contribution to the subject of American affairs in his *Freedom and Slavery in the United States of America* (1863).

NOEL, Sir Gerard Henry Uctred (1845–). A British admiral, son of the rector of Stanhoe, Norfolk. He commanded the naval guard at Cape Coast Castle in 1873; was a Lord of the Admiralty in 1893–98 and rear admiral of the Mediterranean fleet in 1898–99; commanded the Home fleet in 1900–03, the China Station in 1904–06, and at the Nore in 1907–08. In 1908 he became admiral of the fleet. Noel was made K.C.M.G. in 1898, K.C.B. in 1902, and G.C.B. in 1913. He wrote *The Gun, Ram, and Torpedo* (1874).

NOEL, Nicolas (1746–1832). A French physician. Born in Rheims, he went to America in 1776, before finishing his medical studies, and offered his services to Congress. He was appointed surgeon of a regiment in Greene's army; later was transferred to the navy and served as surgeon on the frigate *Boston;* was recalled to Philadelphia to organize hospitals; and from 1781 to 1783 again saw active service. On his return to France in 1784 he became house surgeon at the Hôtel Dieu at Rheims, entered the army in 1792, became inspector of military hospitals in Belgium in 1793, but resigned in 1795 and took up a private practice at Rheims. Among his works are: *Journal d'un chirurgien pendant la guerre pour l'indépendance des colonies anglaises de l'Amerique du Nord* (1787); *Traité historique et pratique de l'inoculation* (1789).

NOETIANS, nō-ē′shans. See Patripassianism.

NOET′IC CONSCIOUSNESS (Gk. νοητικός, *noētikos*, relating to perception, from νόησις, *noēsis*, perception, and ultimately with Eng. *know*). It is affirmed by many psychologists that the essential characteristic of mental process is its reference, beyond itself, to some object; so that the only possible criterion of the ultimateness and irreducibility of a mental function is the irreducibility of the mode in which it thus refers to its object. Brentano distinguishes between ideation (or noetic consciousness), judgment or belief, and interest or liking. Stout, however, has recently raised the question whether it is possible for a sentient being to exist entirely devoid of thought, i.e., to possess an anoetic consciousness. To such a consciousness the antithesis of subject and object would be meaningless; while there would seem to be no road from mere sentience to thought by any process of differentiation or complication. Stout leaves the question unanswered, except in so far as the two difficulties just raised appear to prevent, for him, any genetic passage from an anoetic to a noetic mind. The problems involved are of special interest to the epistemologist and the student of the evolution of mental function. As was suggested at the outset, the concern of an analytical psychology with the problem depends upon its definition of mental process; those psychologists who regard mental process not as characterised by objective reference, but simply as existential experience, refer the problems of the noetic consciousness to epistemology. Consult: Stout, *Analytic Psychology* (London, 1896); Brentano, *Psychologie vom empirischen Standpunkte*, i (Leipzig, 1874); Sir W. Hamilton, *Lectures on Metaphysics*, ii (London, 1859).

NOFRI, nŏ′frē, Andrea. See Ciccione.

NOGALES, nō-gä′läs. A town in the State of Sonora, Mexico, on the boundary of Arizona and on the Santa Cruz River, separated from the American town of Nogales by a street called International Avenue (Map: Mexico, C 2). It is an important railway centre and port of entry. It is the starting point of the Southern Pacific lines of Mexico. It carries on an active import and export trade with the United States. In 1913 the exports were valued at $10,310,543 and the imports at $1,856,563 Mexican silver. It is the seat of a United States consul. Pop., 1901, 2738; 1915 (est.), 3640.

NOGALES, nō-gä′lĕs. A town and the county seat of Santa Cruz Co., Ariz., 68 miles south of Tucson, on the Southern Pacific Railroad (Map: Arizona, E 6). The new town hall and the county courthouse are the most attractive buildings, while of interest are the ruins of the Tumacacori Mission, built by Father Kino about 1687. The chief industries of Nogales are cigar making and the manufacture of mining machinery. The water works and sewage plant are owned and operated by the town. Nogales is separated from the Mexican town only by a street. Pop., 1900, 1761; 1910, 3514.

NOGARET, nŏ′gȧ′rā′, Guillaume de (1260-70–1313). A French lawyer, pamphleteer, and statesman, born at Toulouse. He studied civil and canon law and for a short time after 1291 taught jurisprudence at the University of Montpellier. In 1293 he entered the service of King Philip IV and for the remainder of his life devoted his talents to extending the power of that wily monarch by all the arts of the shyster in high places. In 1295 or 1296 he became a member of the royal council, and in 1307 was made Keeper of the Seal and consequently the leading minister of the King. The prominence which Nogaret achieved was due to his activity in the epoch-making struggle between Philip IV and Pope Boniface VIII. In this conflict and the problems which grew out of it Nogaret's Albigensian blood—his father and probably his mother perished at the hands of the Inquisition—doubtless heightened the fervor of his legal and royalist opposition to the papal claims. Boniface VIII (q.v.) had ascended the papal throne with the firm determination to assert the authority over the lay rulers which his great predecessors, Gregory VII and Innocent III, had done so much to establish. Philip was inclined to give way when Nogaret brought forward his audacious plan. This was that he himself should go to Italy, seize Pope Boniface, carry him to France, and have him tried and deposed by a church council for heresy, simony, and many other crimes (which Nogaret was ready to trump up against him). The King having consented to the plan, and having provided Nogaret with money and a commission (1303), the latter reached Italy in June and succeeded, with the aid of Boniface's enemies, in getting together about a thousand men. With these troops he and Sciarra Colonna (see Colonna) captured (September 7) the little town of Anagni together with Boniface. It proved impossible, however, for Nogaret to carry off the Pope, for the people rose and within two days forced the invaders to flee. The aged Boniface returned to Rome and died October 12 of the same year.

The attack on Boniface left Philip and Nogaret in a difficult position, since they were surely *ipso facto* excommunicate for the attempt upon the Pope. But Popes Benedict XI (1303) and Clement V (1305–14) were little minded to push matters against such a powerful monarch. They did refuse, however, to pardon Nogaret, who remained under excommunication *latæ sententiæ*. By Philip Nogaret was rewarded and promoted; yet he was not satisfied, for the loss of the King's favor would promptly ruin him, and his ambition to "found a family" would be futile, since an excommunicated person could not have legal heirs. He acted on a royal commission which examined and freed some of the prisoners of the Inquisition (1304); was the principal agent in the "squeezing" of the Jews (1306); and there is little doubt that his was the mind which devised the diabolical scheme for destroying and despoiling the Templars (q.v.), who were arrested shortly after he became Keeper of the Seal (1307). Pope Clement V found his position very difficult, and in the end was constrained to accede to King Philip's wishes, and to absolve Nogaret (1311) and destroy the Templars (1312). Although his absolution was accompanied by the imposition of a penance—that he should go on the next crusade—Nogaret's sang-froid was apparently intact a year later, for he published a pamphlet pointing out the need of the crusade—which never took place. The career of this French minister provides probably the best illustration of some of the more despicable factors involved in the change from "sacerdotal to secular supremacy" which set in with the age of Boniface VIII and Philip IV.

Consult: Ernest Renan, in *Histoire littéraire de la France*, vol. xxvii (Paris, 1887); Robert Holtzmann, *Wilhelm von Nogaret* (Freiburg, 1898); Heinrich Finke, *Aus den Tagen Bonifaz VIII* (Münster, 1902); Auguste Molinier, *Les sources de l'histoire de France*, vol. iii (Paris, 1903).

NOGARET, Jean Louis de. See Epernon, J. L. de Nogaret, Duke d'.

NOGENT, nŏ′zhäN′, Guibert de. See Guibert de Nogent.

NOGENT-SUR-MARNE, sur-märn′. A town of France, in the Department of Seine, situated on a bend of the Marne, 3 miles east of Paris, to the east of the Forest of Vincennes (Map: Paris and vicinity). It is on the middle line of Paris fortifications and has an old Gothic church, a monument to Watteau, manufactures of pottery and chemicals, and extensive stone quarries. Pop., 1901, 10,391; 1911, 14,051.

NOGI, nŏ′gē, Maresuke, Count (1849–1912). A Japanese soldier, born of a Samurai family at Hagi, Choshin. He was appointed a major in 1871; participated in the civil war of 1877; fought as commander at Kinchow and Port Arthur in the war with China (1894–95); and at the end of the war was made lieutenant general in command of a division. He was appointed governor-general of Formosa in 1896, but in 1900 left the army to devote himself to farming. Promoted to the rank of general, he took command in 1904 of the Third Army destined for the reduction of Port Arthur, and after a most sanguinary series of conflicts received the surrender of the fortress on Jan. 2, 1905. His two sons fell in the course of operations. After the fall of Port Arthur Nogi moved his army north in time to participate in the battle of Mukden, where his flanking movement around the Russian right determined the outcome of the battle. He was created Baron in 1895 and Count in 1906. On the death of his beloved Mikado in 1912 he and his wife committed hara-kiri in accordance with the traditions of old Japan, to which Nogi had always been faithful. See RUSSO-JAPANESE WAR.

NOGUCHI, nō′gōō-chē, HIDEYO (1876-). A Japanese physician, born in Inawashiro, Yama, Fukushima. He graduated from the Tokyo Medical College in 1897, and became assistant in the General Hospital there. He held several public medical offices in Japan, among them that of quarantine officer of Yokohama Harbor Station in 1899, and for a time was physician in charge of the Central Hospital at Newchwang, China. In 1901 he came to the United States and studied at the University of Pennsylvania; in 1903–04 he was connected with the Staten Serums Institut, Copenhagen; returning to America he worked at the Carnegie Institute in Washington; and in 1904 he joined the staff of the Rockefeller Institute, New York, of which he became a member in 1914. Noguchi gave special attention to the serpent venoms, the microscopy of infantile paralysis, hydrophobia, and syphilis, and to the spirochætæ; and found a method of hemolytically diagnosing syphilis, following Wassermann's method, the so-called Noguchi luetin reaction. He is the author of *Serum Diagnosis of Syphilis; and Luetin Reaction* (1910; 4th ed., 1914) and of many (reprinted) essays.

NOGUCHI, YONE (1875-). A Japanese author and educator. He was born in Isushima and was educated in Tokyo at the Keio University, where he afterward became professor of English literature. During 1893–1904 (except 1903, spent in London with Yoshio Markino) he was in America, much of the time in California, where he was a domestic servant for a time, and where he became a friend of Joaquin Miller. He was in England for a second time in 1913–14 and lectured at Oxford on Japanese poetry. Noguchi wrote: *Seen and Unseen* (1897); *The Voice of the Valley* (1898), on the Yosemite; *The American Diary of a Japanese Girl* (1902, 1913); *From the Eastern Sea* (1903, 1910); *The Summer Cloud* (1906); *The Pilgrimage* (1909, 1912); *Lafcadio Hearn in Japan* (1911); *Through the Torii* (1914); *The Spirit of Japanese Poetry* (1914); *The Story of Yone Noguchi* (1914); *The Spirit of Japanese Art* (1914).

NOGUCHI'S TEST. See NOGUCHI, HIDEYO; SYPHILIS.

NOHL, nōl, LUDWIG (1831–85). A German musical lecturer, scholar, and writer, born at Iserlohn. He was educated for the law, but subsequently followed the profession of music. He studied under Dehn and Kiel and in 1860 became lecturer at Heidelberg. Towards the close of his life he settled in Heidelberg as a lecturer at the university. He was one of the earliest, most fearless, and most influential defenders of Wagner's art. His writings have been translated into both French and English. They include: *Beethovens Leben* (1864–77); *Briefe Beethovens* (1865); *Mozarts Briefe* (1865); *Beethoven, Liszt, Wagner* (1874); *Beethoven nach den Schilderungen seiner Zeitgenossen* (1877); *Mozart nach den Schilderungen seiner Zeitgenossen* (1880); *R. Wagner's Bedeutung für die nationale Kunst* (1883); *Das moderne Musikdrama* (1884).

NOILS (OF. *noiel*, *nuiel*, button, buckle, *newel*, stone of a fruit, Fr. *noyau*, kernel, from Lat. *nux*, nut, or possibly a dim. of OF. *nou*, knot, from Lat. *nodus*, knot). The short and broken fibres which are removed from wool in the process of combing and preparing it for worsted manufactures. The noils, many grades of which are valuable, are used for making inferior yarns and for felting purposes.

NOIRÉ, nwä′rā′, LUDWIG (1829–89). A German philosophical writer, born at Alzey in Hesse. From 1846 to 1848 he pursued his studies at Giessen, after which he became a teacher at the Gymnasium in Mainz. His studies led him to the effort to construct a system of monistic philosophy according to which the universe is a single reality of which sensation and motion are the two aspects. In 1874 he published *Die Welt als Entwickelung des Geistes*. This was followed by *Der monistische Gedanke: eine Concordanz der Philosophie Schopenhauers, Darwins, Robert Mayers, und L. Geigers* (1875) and *Aphorismen zur monistischen Philosophie* (1877). He also wrote the preface to Max Müller's English translation of Kant's *Kritik der reinen Vernunft*, which is a sketch of the history of philosophy; *Der Ursprung der Sprache* (1877); *Einleitung und Begründung einer monistischen Erkenntnistheorie* (1877); *Logos* (1885).

NOISSEVILLE, nwäs′vēl′. A village of Lorraine, about 4 miles east of Metz, noted as the scene of a battle fought between the French under Bazaine, numbering about 120,000 men, and an army of 40,000 Germans, Aug. 31–Sept. 1, 1870. Hoping to break the German cordon around Metz and effect a junction with the army of MacMahon, Bazaine transported his forces to the right bank of the Moselle, and by a fierce attack succeeded in taking the villages of Montoy, Courcy, and Servigny. The Germans rallied and recaptured Servigny. Fighting was resumed on the following day, and resulted in the retreat of the French across the river.

NOLA, nō′lȧ. An episcopal city in the Province of Caserta, Italy, 15 miles east-northeast of Naples by rail (Map: Italy, E 4). The cathedral, dating from the fifteenth century, was partly destroyed by fire in 1870. The seminary near by has interesting antique inscriptions. The city has a Franciscan cloister, a sixteenth-century palace of the Orsini, a lyceum, technical school, seminary, and manufactures of spirits, starch, and woodenware. The ancient Nola fell into the hands of the Romans in the Samnite War (313 B.C.). The town held out against Hannibal in the Second Punic War. Augustus died at Nola, 14 A.D. Numerous antiquities have been found in the vicinity. Two yearly fairs are held here, as well as the annual festival in honor of St. Paulinus, the inventor of the church bell. Pop. (commune), 1901, 14,622; 1911, 14,900.

NÖLDEKE, nĕl′de-ke, THEODOR (1836–). A German Orientalist. He was born in Harburg and pursued his university studies chiefly at Göttingen. In 1864 he was made extraordinary professor at Kiel and in 1868 full professor. In 1872 he accepted the chair of Semitic philology at Strassburg. Nöldeke became the leading authority in his special field of research. In *Orientalische Studien*, dedicated to him on his seventieth birthday, Prof. Ernst Kuhn gives a list of 564 publications, books, pamphlets, articles, and book reviews by Nöldeke. Among his chief works may be mentioned *Geschichte des Korans* (1860; 2d ed. by Schwally, 1909); *Das Leben Mohammeds* (1863); *Die alttestamentliche Litteratur* (1868); *Untersuchungen zur Kritik des alten Testaments* (1869); *Die Inschrift des Königs Mesa von Moab* (1870); *Mandäische Grammatik* (1875); *Kurzgefasste syrische Grammatik* (1880; 2d ed., 1898); *Die semitischen Sprachen* (1887; 2d ed., 1899); *Aufsätze zur persischen Geschichte* (1887); *Persische Studien* (1888–92); *Delectus Veterum Carminum Arabicorum* (1890), with A. Müller; *Orientalische Skizzen* (1892); *Das iranische Nationalepos* (1896); *Fünf Mo'allaqat*, i–iii (1899–1901); *Beiträge zur semitischen Sprachwissenschaft* (1910); *Burzöes Einleitung zu dem Buche Kalila wa Dimna* (1912); *Untersuchungen zur Achikar-Roman* (1913).

NOLHAC, nô′làk′, PIERRE DE (1859–). A French historian and critic, born at Ambert, Puy-de-Dôme. He received his early education in Paris and was a student at the French school in Rome (1882–85). On his return he studied at the Bibliothèque Nationale for a year, and then was made professor at the École des Hautes Etudes. In 1892 he was made director of the Versailles National Museum. His works include: *Le dernier amour de Ronsard* (1882); an edition of the *Lettres de Joachim du Bellay* (1883); Le *"Canzoniere" autographe de Pétrarque* (1886); *Erasme en Italie* (1888); *Marie-Antoinette* (1890); *Histoire du château de Versailles* (1900–01); *Louis XV et Mme. de Pompadour* (1903); *J. M. Nattier* (1904); *Les jardins de Versailles* (1905); *Les femmes de Versailles* (1906); *François Boucher* and *J. H. Fragonard* (both 1907); *Pétrarque et l'humanisme* (1907); *Madame Vigée-Lebrun, peintre de la reine Marie-Antoinette* (1908); *Versailles* (1908–09); *Versailles et Trianon* (1909); *Nattier, peintre de la cour de Louis XV* (1909); *Hubert Robert, 1733–1808* (1910).

NO′LI ME TAN′GERE (Lat., touch me not). The words spoken by the risen Christ to Mary Magdalen (John xxviii. 17). The resurrected Christ is represented as forbidding by a gesture the adoring Magdalen to touch him. The subject was a favorite one in Italian art, and is often represented in the cycles depicting the life of Christ, as in the frescoes by Giotto in the Arena Chapel, Padua, and in Duccio's series on his great altar of the "Majestas," Siena. Among the best-known paintings on this subject are those by Albertinelli in the Louvre, Correggio in the Prado (Madrid), and, finest of all, the version by Titian in the National Gallery, London, in which the landscape is equally as important as the beautiful figures.

NOLL. A popular name for Oliver Cromwell.

NOL′LEKENS, JOSEPH (1737–1823). An English sculptor, of Dutch descent, born in London. In 1750 he studied sculpture with Peter Scheemakers, and as the winner of several prizes offered by the Society of Arts was enabled in 1760 to start for Rome. While there he modeled a portrait bust of Garrick, which was followed by busts of Sterne and others. In 1770 he settled in London, where he was made a member of the Royal Academy in 1772. He soon became the most fashionable portrait sculptor of the day, counting among his sitters George III, Prince and Princess of Wales, Oliver Goldsmith, Dr. Johnson, Warren Hastings, Pitt, Fox, and many other celebrities. His busts are lifelike and truthful in characterization, and upon them his reputation rests. Among his more ambitious works are the statue of Pitt in Cambridge, the sepulchral monuments of the "Three Captains," Westminster Abbey, and of Mrs. Howard, Corby Church, Cumberland. Of his ideal statues the most popular are the so-called Venuses, e.g., "Venus Chiding Cupid," "Venus Anointing her Hair," and the "Seated Venus," now at Petworth. Nollekens was also renowned for his parsimony. Consult curious but unfairly prejudiced biography of Smith (London, 1829; new ed., 1894).

NOLLENDORF, FRIEDRICH HEINRICH FERDINAND EMIL, COUNT KLEIST VON. See KLEIST VON NOLLENDORF, F. H. F. E.

NOL′LE PROS′EQUI (Lat., will not prosecute). An entry on the records of a court by the public prosecutor in a criminal case or the plaintiff in a civil action, to the effect that the proceedings against the defendant shall be discontinued. This method of terminating legal proceedings originated in England during the reign of Charles II, and seems to have been devised as a convenient means of nullifying certain obnoxious statutes by thus ending any prosecution under them. The practice was subsequently adopted into the civil procedure in England to enable a plaintiff to discontinue his action, but it was later superseded by the common-law nonsuit.

In the United States to-day the practice of entering a *nolle prosequi*, or *nol. pros.*, as it is usually called, is confined almost exclusively to criminal proceedings. The right thus to discontinue a criminal prosecution is a prerogative of the State, and it generally rests in the discretion of the prosecuting officer whether to exercise it or not, though in some States the consent of the court must first be obtained, and generally where the case has proceeded to trial the consent of the court is required. A *nol. pros.* entered after the jury has been sworn and trial commenced will operate as an acquittal and a bar to any future prosecution for the same offense. (See JEOPARDY.) Under modern codes of civil procedure the method of abandoning legal proceedings is by discontinuance or by allowing a nonsuit; but in a few jurisdictions where common-law pleading and practice still obtain, a *nolle prosequi* seems to be a permissible way of ending an action on the part of the plaintiff. See NONSUIT; PLEADING; PRACTICE.

NOMA. See CANCRUM ORIS.

NOM′AD (from Lat. *nomas*, from Gk. *νομάς*, roaming, from *νέμειν*, *nemein*, to pasture, distribute). A term primarily applied to those peoples whose resources were chiefly flocks and herds. All the industries and conveniences of nomadic life grow out of this one fact. Grass and water are the chief essentials, hence nomads dwell always in regions where pasture is the best and water is not far to seek. Their habitations must admit of being transported from place to place, and hence consist of tents; their furniture is largely of skins; they clothe themselves in hides and woolen cloth. The saddle and harness, sleds and wagons, roads and land commerce, all spring out of the taming of horses, asses, cattle, sheep, goats, camels, and reindeer—the characteristic wealth of nomadic peoples. See Pack Transportation.

NOMA'DA (Neo-Lat., from Gk. *νομάς*, *nomas*, roaming). A genus of bees typical of the family Nomadidæ, including species which live parasitically in the nests of other bees and are called cuckoo bees. Often there is enough food both for the larvæ of the cell maker and the larvæ of the cuckoo bee, and both thrive and issue simultaneously as adults. The larva is smooth, tapering towards each end, and has a small head. The pupa has three conspicuous spines on the upper and posterior edge of the orbit, which seem to aid in locomotion. See Cuckoo Bee.

NO MAN'S LAND. 1. A region 170 miles in length and about 35 in width, north of Texas, ceded to the United States in 1850 and made a part of Oklahoma in 1890. Between those years the district was under no form of government, and became a resort of outlaws.

2. A narrow district on the line between Delaware and Pennsylvania. Although it is held to belong to Pennsylvania, some of the inhabitants perform their legal obligations in Delaware, while others do not recognize their citizenship in either State.

NOMARCHY, nŏm'*a*r-kĭ, or **NOME.** The largest administrative division of Greece. Since 1913 the nomarchies have numbered 30. They are subdivided into eparchies, which in turn are made up of demarchies. The administration of the nomarchy is in the hands of a nomarch, appointed by the government for an indefinite term. His duties are much like those of the French prefect. Like him, he is assisted by a council elected by universal suffrage, but for a fixed term. The eparchy corresponds to the French arrondissement and the demarchy to the commune.

NOME (Lat. *nomus*, from Gk. *νόμος*, *nomos*, province, district, from *νέμειν*, *nemein*, to pasture, distribute). The name given by the Greeks to the provinces or districts into which Egypt was divided, from the earliest historical period down to the time of the Roman dominion. It is probable that the nomes were the remains of small independent states which in very early times were united under a single monarchy. Each nome possessed its own god or group of gods, worshiped in the local temple, as also its own myths and religious traditions. The government of the nome was a copy, in miniature, of that of the state. At the head stood the nomarch, or governor, and under him was a regular gradation of officials, each responsible to his immediate superior. In the earlier period each nome had its own treasury, its own courts of justice, and its own military establishment. Under the feudal system of the Middle Empire the nomarchs were the heads of ancient noble families, and were prompt to take advantage of any weakness in the central government to make themselves practically independent princes. The old nobility was, however, extinguished in the Hyksos wars, and from the time of the New Empire the nomes were purely administrative districts ruled by royal governors, who still bore the title of nomarchs. In the time of the Ptolemies the chief officer of the nome was the strategos, under whom the nomarch was a subordinate official charged with supervising the collection of taxes and other financial matters. In general there were some 42 nomes, 22 in Upper and 20 in Lower Egypt, but the number was not invariable. So far as is at present known the number of the nomes never fell below 36 nor exceeded 47.

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NOME, nōm. The largest city of Seward Peninsula, Alaska, situated on the north shore of Norton Sound, Bering Sea (Map: Alaska, E 4). It is the centre of the productive Nome gold-mining district, which now covers the greater part of Seward Peninsula (q.v.). In 1898 the streams in the vicinity were prospected with promising results, and the creek diggings were being actively operated when the news of the rich beach deposits, discovered in January, 1899, though their importance remained unrecognized until July, caused a rush to the beach, where about 2000 men were working by October. The output of the district rose from $2,800,000 in 1899 to a maximum of $7,500,000 in 1906, since which year it has steadily decreased, being less than $3,000,000 in 1913 and about $2,500,000 in 1914. During this period a mushroom settlement, first called Anvil City, had sprung up. This town was replaced by a permanent city of frame structures after June, 1899. In the early days food and fuel supplies were sources of great anxiety, and the unsanitary conditions, the scanty water supply, and the climatic harshness caused considerable sickness. Its exposed situation on Norton Sound subjects it to serious damage from violent storms. Nome is the commercial, judicial, and educational centre of Seward Peninsula. It is a fully organized city, compactly built, with a municipal government, fire and police departments, sewerage, water, and electric-light systems, telephone service, etc., and with substantial commercial buildings, banks, a courthouse, a post office, hospitals, clubs, etc. A railroad extends from Nome to Shelton, 85 miles, with Paystreak and Sunset branches of 6 miles each. Nome and the adjacent regions are reached direct only between early June and October, during the open season of Bering Sea. Pop., 1910, 2600. Consult *United States Geological Survey, Bulletin*, Nos. 284, 314, 328 (Washington, 1906–08), and A. W. Greely, *Handbook of Alaska* (New York, 1909).

NOME, Cape. See Cape Nome.

NOMELAKI, or **NOAMLAKI.** See Wintun.

NO'MEN (Lat. *nomen*, name, that by which one is known, connected with *nosco*, know). A term used by the ancient Romans to denote the name by which one gens (q.v.) was distinguished from another. (See Agnomen; Cognomen; Prænomen.) The nomen was inherited. It ended originally in -ius. (Cf. Æmilius, Cornelius, Julius, Tullius.) This ending the patrician gentes carefully cherished. A nomen ending otherwise, e.g., in -acus, -ina, -ienus, testifies to non-Roman origin. Consult H. W. Johnston, *The Private Life of the Romans* (Chicago, 1903).

NO'MENCLA'TURE, Scientific. See Classification of Animals; Nosology; Taxonomy.

NOMENOË, nô-mĕn'ô-â. See Brittany, *History*.

NOM'INALISM (from *nominal*, from Lat. *nominalis*, relating to names, from *nomen*, name; connected with Gk. *ὄνομα*, *onoma*, Skt. *nāman*, OChurch Slav. *ime*, OIr. *ainm*, Goth. *namō*, OHG. *namo*, Ger. *Name*, AS. *nama*, Eng. *name*). The philosophical theory that only individual objects have real existence and that so-called universals (see Judgment) are nothing but names given in common to actually different objects having nothing else in common. These names were considered as nothing but so much breath (*flatus vocis*), without indicating any real identity in the objects which shared in the identical names. This view was an extreme development of the Aristotelian doctrine that all reality is individual and that universals have existence only in individual objects; and it was called forth by the extreme realists (see Realism), who maintained that universals have an existence prior to particulars and individuals and that the process of creation is only the progressive, logical differentiation of the universal. This question of the relation of the universal and the particular was mentioned in Boethius' translation of a work by Porphyry on Aristotle's *Categories*, but no decision on the question was given. From this fact it may be supposed that nominalism and realism formed subjects of discussion in the third and fourth centuries, but that no partisanship had at that period developed. At the beginning of the twelfth century, however, the issue between the conflicting views was debated with much zeal and acrimony. Realism was advocated by Bernard of Chartres, Guillaume de Champeaux (q.v.), and Walter of Montagne. Nominalism, on the contrary, was maintained by Roscelinus (q.v.). Abélard represented a modified nominalism in maintaining that the universal is not a real objective existence nor, on the contrary, a mere word (*vox*), but the meaning of the word. This view, which is called sermonism (from *sermo*, which in scholastic Latin meant "predicate"), is a type of conceptualism (q.v.) peculiar to Abélard, and is to be distinguished from other forms of conceptualistic doctrine in that it did not point expressly to the fact that meanings are mental facts. With Abélard meanings seemed to reside in words, not as words, but as predicates of propositions. The question thus debated was in those days not a merely logical question, but had a theological bearing. The doctrine of transubstantiation was seen to be involved, for if there is no real community between what to sense appears as two different things, bread and wine cannot be said to become in the Eucharist the body and blood of Christ. Hence the Church was irreconcilably opposed to nominalism. The Arabian philosophers, and especially Avicenna (q.v.), had succeeded in mediating between nominalism and realism by maintaining that universals are before individuals (realism) in the mind of God, in individuals (Aristotelianism) as their developed essence, and after individuals (nominalism) in human minds (conceptualism). This was the view adopted by Thomas Aquinas (q.v.) in his system and so incorporated in the received philosophy of the Roman church. Nominalism received its last strong support in the teaching of William of Occam (q.v.) in the fourteenth century; but the influence of this revival was transitory, coming as it did upon the eve of the Renaissance and the growing lack of interest in scholastic problems. In modern philosophy there are nominalistic tendencies in certain circles. Thus, Berkeley was quite nominalistic in denying the existence of abstract ideas, and in this he was followed by Hume and by what is called English sensationalism (q.v.). Consult: Löwe, *Der Kampf zwischen Nominalismus und Realismus im Mittelalter: sein Ursprung und sein Verlauf* (Prague, 1876); Josef Reiners, *Der Nominalismus in der Frühscholastic* (Münster, 1910); also the histories of philosophy by Ueberweg-Heinze, Windelband, Erdmann.

NOM'INA'TION (Lat. *nominatio*, from *nominare*, to name, from *nomen*, name). In politics, the formal selection and presentation of a candidate for an elective office. In the United States, before the development of political parties, candidates for office were frequently nominated at private conferences or caucuses of the leading citizens of the community. Sometimes no formal nominations were made, and candidates were self-announced. By 1800 parties were fairly well organized, and the necessity arose of devising some means of selecting the candidates for offices. In national elections this was supplied by the congressional caucus, which assumed the right of choosing presidential and vice-presidential candidates and of determining the policy of the party. (See Caucus; Convention.) This method lasted until 1824. With the commencement of the revolt against the congressional caucus several other temporary methods of nomination sprang into existence. These were nomination by the State Legislatures as a whole, nomination by party caucuses of the State Legislatures, nomination by State conventions, and nomination by public meetings. All these proved to be ineffectual and were superseded by the method of national convention, which came permanently into existence between 1830 and 1840, the first such convention being that of the Antimasonic party in 1832. This has continued to be the accepted method of nominating candidates for President and Vice President. Generally the choice of the convention is determined by the votes of a majority of the delegates; but in the case of the Democratic party a two-thirds vote is necessary for a choice. The convention system was the prevailing mode of nominating candidates for State and local office in the last half of the nineteenth century, but the abuses of machine control of conventions became so flagrant that a powerful movement for direct nominations through primaries appeared in the last decade of the century. Important laws were enacted in Florida, Oregon, and Minnesota in 1901, and in 1903 the first State-wide primary law was enacted in Wisconsin. From that time the progress of primary laws was very rapid. Not only State and local officials but United States Senators as well fell under primary nomination, and in the elections of 1912 presidential primaries were held in many of the States, either by State law or under the auspices of the several parties. In addition to the convention and primary methods of nomination, nominations may be made by the old English method of self-announcement, which exists in communities like some of the Southern States, where practically only one political party exists and the success of the party is not endangered by a multiplicity of candidates; also the method of nomination by petition, according to which the candidate may be put forward by filing with the proper officer a paper signed by a certain specified number of qualified voters. In those parts of the country where the New England town meeting exists, local candidates are frequently put in nomination by that assembly. In the cities local elective officers are almost invariably nominated by primary caucus or delegate conventions. Consult: Meyer, *Nominating Systems* (Madison, 1902); Merriam, *Primary Elections* (Chicago, 1908); Bryce, *American Commonwealth*, vol. ii (New York, 1910); F. W. Dallinger, *Nominations for Elective Office in the United States* (new ed., Cambridge, Mass., 1914). See Primary Elections; Electoral Reform.

NOM′INATIVE CASE. See Declension.

NOMOC′ANON (Gk. *νομοκάνων*, *nomokanōn*, from *νόμος*, *nomos*, law + *κανών*, *kanōn*, rule, canon). In the Greek church, the collection of ecclesiastical laws, both those proceeding from the church (*canones*) and those from the state (*nomoi*). The first collection was made in the sixth century, but was superseded by that of Photius (q.v.) in the ninth century, and later by the most important in the fourteenth, the so-called *Syntagma*.

NO NAME. A novel by Wilkie Collins (1862).

NONCOM′BATANT. A noncombatant has been defined by the late Gen. George B. Davis, Judge-Advocate-General, United States Army, in his *Elements of International Law*, as "a resident of a belligerent state who takes no part in the war. He is not subject to the laws of war, and is protected by them, in his person and property, so long as he refrains from participation in military operations." The same authority in the work cited, which is the authorized textbook for the United States army service schools, also discusses combatants, stating that "a *combatant* is a person who, with the special authorization of his government, takes part, either *directly* or *indirectly*, in the operations of war. The term includes, in addition to the troops of the line, all staff officers, surgeons and chaplains, officers and employees of the supply and transport service, all agents, contractors, and others who accompany the army in an official capacity and who assist in its movement, equipment, or maintenance, and all retainers to the camp." Consult G. B. Davis, *Elements of International Law* (3d ed., New York, 1908).

NON′COMMIS′SIONED OFFICER. A soldier holding a rank intermediate between that of private and the commissioned officer. In the United States army a noncommissioned officer is an enlisted man, accepted for a definite period of 7 years, and given an appointment or warrant by his immediate military superior. An officer receives a permanent commission from the President, and the appointment must be confirmed by the Senate. The following classification gives the principal noncommissioned grades of the United States army in the order of their precedence: 1. Sergeant major, regimental, and sergeant major, senior grade, coast artillery corps; master electrician, quartermaster corps; master electrician, coast artillery corps; master signal electrician; chief musician; engineer, coast artillery corps. 2. Ordnance sergeant; quartermaster sergeant, quartermaster corps; sergeant, first class, hospital corps; electrician sergeant, first-class, coast artillery corps; sergeant, first-class, quartermaster corps; first-class signal sergeant. 3. Quartermaster sergeant and commissary sergeant, regimental; electrician sergeant, second-class, coast artillery corps; master gunner, coast artillery corps. 4. Sergeant major, squadron and battalion; sergeant major, junior grade, coast artillery corps; color sergeant; battalion quartermaster sergeant, engineers and field artillery. 5. First sergeant; drum major; principal musician; chief trumpeter; fireman, coast artillery corps. 6. Sergeant; quartermaster sergeant, company; staff sergeant. 7. Corporal. In each grade date of appointment determines the order of precedence. See Corporal; Sergeant; Staff.

The noncommissioned officer of to-day must possess the ability to assume executive command in any emergency demanding prompt action and tactical ability; consequently only the most intelligent of the enlisted men are selected for promotion. United States army regulations permit a certain proportion of noncommissioned officers to obtain commissions annually, and in other ways make the rank very desirable. In the English army, except in rare instances, social conditions have precluded the possibility of any noncommissioned officer of humble birth attaining the commissioned rank as a combatant officer; for although commissions are granted as quartermasters, riding masters, and occasionally as officers in certain divisions of the artillery and in the engineers, they are only given after a lifetime of service, and are to all intents and purposes honorary positions. During the Boer War of 1899–1902 and the European War of 1914 the heavy casualties among officers, as well as the demands for officers for the new organizations formed, made it necessary in many instances to admit qualified noncommissioned officers to the commissioned ranks, apart from any family or social consideration—and it was expected that this would lead to an order of things similar to that of the United States army. In Italy nearly one-third of the officers of each arm of the service are taken from the noncommissioned ranks. (See Military Education.) The German army system, as also that of France, makes special provision for the training of noncommissioned officers.

NON′CONFORM′ISTS (from *non-*, not + *conformist*, from Lat. *conformis*, similar, from *com-*, together + *forma*, form). A name given generally to those who do not conform to the religion of an established church. The most frequent use of the word, however, is in relation to those who at any period in English history since the Reformation have refused to conform to the doctrines and practices of the Church of England; though even here, in ordinary usage, it designates only Protestant dissenters. The unification of the English Nonconformists, in spite of their varying beliefs, as one body over against the Established church practically dates from the repressive measures enacted soon after the Restoration in the first flush of reactionary zeal. The Act of Uniformity (1662), requiring assent from all clergymen to everything contained in the Prayer Book, drove out nearly 2000 of them, or about one-fifth of the whole number of clergy; these were the first to be formally known as Nonconformists. In the place of Puritanism, now extinct, came political nonconformity, which has since had its seat principally in the middle or lower-middle classes of England, and whose incessant efforts have by this time succeeded in depriving the Church of England of most of its exclusive privileges. The Act of Uniformity was followed by the Corporation Act, which attacked the Dissenters in one of their strongholds; the Conventicle Act, which prevented their gathering in any number; and the Five Mile Act, forbidding ejected ministers to come within 5 miles of their former parishes.

The next epoch-making date is that of the Toleration Act of 1689, which, while it only relaxed and did not repeal the penal statutes, was at the time regarded as a great charter of religious liberty. Nonconformists acquired legal security for their chapels and funds, with something approaching a clerical status for their ministers. But its policy of grudging and partial indulgence perpetuated the division of the nation into two more or less hostile bodies of Churchmen and Dissenters. Niggardly as it was, it recognized dissent, and shook the belief that the state was bound to provide all its members with a religion and to force it, if necessary, upon their acceptance.

Throughout the nineteenth century, especially the last two-thirds of it, there was a pertinacious struggle for further recognition on the part of the Nonconformists, crowned with considerable success—though the great object of political nonconformity, the disestablishment of the Church of England, seems farther off than it was. In 1836 Dissenters were allowed to be married by their own ministers and rites; the commutation of tithes (q.v.) into a rent charge rendered their collection less odious; registration of births, deaths, and marriages was transferred from the church to the state; and a charter was given to the free University of London, which imposed no religious tests. Perhaps the most important of the later gains of nonconformity have been in the department of education—the great universities having been thrown open to its young men in 1871, and a system of state schools rendering them independent of the Church for primary education. The Burials Act of 1880, allowing their ministers access to the churchyards for funerals, was another concession that had been loudly demanded by them. Generally of an aggressive liberal type in politics, and still smarting under a sense of social inferiority, they form a compact body of no small political power. Consult: H. W. Clark, *History of English Nonconformity* (2 vols., London, 1911–13); W. B. Selbie, *Nonconformity* (ib., 1912); "The Literature of Dissent," in *Cambridge History of English Literature*, vol. x (New York, 1913). See ESTABLISHMENTS, ECCLESIASTICAL; LIBERTY, RELIGIOUS.

NONEFFEC'TIVE. This term in its military sense applies to all officers or men not available for active service. Retired or half-pay officers, pensioners, deserters, sick or wounded, and those held prisoner by an enemy are reported as noneffectives.

NONES. See KALENDS.

NON-EUCLIDEAN GEOMETRY. See GEOMETRY.

NONFEA'SANCE (from *non-*, not + *feasance*, deed, from Fr. *faisant*, pres. p. of *faire*, from Lat. *facere*, to do, make). The omission to do an act which one is under a legal obligation to do. It is the view of some writers that nonfeasance never amounts to a tort; that to avoid committing a tort one need only to forbear to act. But this is clearly erroneous, as, if an owner of a factory fails to comply with a law requiring him to equip it with fire escapes, in case of fire he is liable in damages to the person burned. His nonfeasance is a tort.

The term is frequently used in connection with the liability of an agent or servant to third persons. The owner of property employs an agent to manage it and keep it in proper repair. The agent omits to make repairs. Clearly he has violated his contract with his principal, who may call him to account therefor; but the weight of judicial authority in America holds there is no privity between the agent and a third person, and that in such a case there must be misfeasance or malfeasance by the agent to render him liable. On the other hand, it has been held by a number of courts that the agent is liable to the injured person. His liability should be determined by the rules applicable to negligence, not by a dictum of 200 years, although its author was the distinguished Lord Chief Justice Holt (q.v.), that "a servant or deputy cannot be charged for nonfeasance, but for a misfeasance an action will lie against him." Consult E. A. Jaggard, *Hand-Book of the Law of Torts* (St. Paul, 1895), and E. W. Huffcut, *Cases on the Law of Agency* (2d ed., Boston, 1907). See MALFEASANCE; MISFEASANCE.

NO'NIUS. See VERNIER.

NO'NIUS MARCEL'LUS. A Latin grammarian and lexicographer, born at Thubursicum Numidarum in Africa, at the beginning of the fourth century A.D. His work entitled *De Compendiosa Doctrina* consisted originally of 20 books, of which the sixteenth, intended as a book of reference on points of lexicography, grammar, and antiquities, is lost. Though the work shows little critical sagacity, it is valued for its citations from the lost Latin authors, particularly of the archaic period. In these citations, as was proved by W. M. Lindsay, *Nonius Marcellus' Dictionary of Republican Latin* (Oxford, 1901), Nonius follows a fixed order; he not only cites authors as a rule in chronological sequence, but his citations of verses from extant plays, e.g., are according to the numerical sequence of the verses cited. For the importance of this fact, unknown to all the authors of the standard editions of the fragments of early Latin, consult C. Knapp, in *American Journal of Philology*, vol. xix, pp. 478–482 (Baltimore, 1908). There are editions by Mercier (Paris, 1583; reprinted 1826), by Quicherat (Paris, 1871), by L. Müller (Leipzig, 1888), and by W. M. Lindsay (3 vols., Leipzig, 1903). Consult also Henry Nettleship, *Lectures and Essays on Subjects connected with Latin Literature*, 1st series (London, 1885), and W. Teuffel, *Geschichte der römischen Litteratur*, vol. iii (6th ed., Leipzig, 1913).

NONJU'ROR, THE. A comedy by Colley Cibber, produced in 1717. It was adapted from Molière's *Tartufe*.

NONJURORS (from *non-*, not + *juror*, from Lat. *jurator*, swearer, from *jurare*, to swear, from *jus*, law, right). The name given to those clergy of the Church of England who refused to take the oath of allegiance to William and

Mary, believing themselves still bound by their allegiance to James II. They had been avowed champions of the doctrine of passive obedience on the part of subjects towards kings; indeed, Lake, Bishop of Chichester, said on his deathbed that he looked on the doctrine as the distinguishing character of the Church of England, for which he would lay down his life. The House of Commons allowed the clergy six months longer than the laity to take the oath. Sancroft, Archbishop of Canterbury, with seven bishops and about 400 other clergy, refused it, and were deprived of their sees and benefices. The most distinguished of the Nonjurors was the saintly Bishop Ken; the scholars Hickes and Dodwell were also Nonjurors. They treated all who took the oath as schismatics, and themselves and their adherents as the only true members of the Church of England, and even went so far as to draw up a new liturgy of their own. Their organization, unsubstantial as it was, lingered for over a century, its last bishop dying in 1805. Consult: Lathbury, *History of the Nonjurors* (London, 1845); *The Life and Times of John Kettlewell*, edited by T. T. Carter (New York, 1895); J. H. Overton, *The Nonjurors* (London, 1902).

NON'NUS (Lat., from Gk. *Νόννος*, *Nonnos*). A Greek poet of Panopolis in Egypt, probably of the fifth century A.D. While a pagan he wrote a vast epic, preserved under the name of *Dionysiaca* (*Διονυσιακά*), in forty-eight books. It deals chiefly with the expedition of Dionysus to India. Though somewhat bombastic in style, the work is not without poetic spirit, is marked by great skill in the handling of the hexameter, and is one of the chief sources of information on the growth and development of the Dionysiac cycle of myths. After adopting Christianity, Nonnus made a paraphrase of the Gospel of St. John in Greek hexameters. The best editions of the *Dionysiaca* are those of Graefe (Leipzig, 1819–26), Count de Marcellus (1856), and Köchly (Leipzig, 1858). The paraphrase has been edited by Passow (Leipzig, 1834) and A. Scheindler (1881). Consult: Reinhold Köhler, *Ueber die Dionysiaka des Nonnus* (Halle, 1853); Arthur Ludwich, *Beiträge zur Kritik des Nonnus* (Königsberg, 1873); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii, part ii (5th ed., Munich, 1913).

NONPAREIL, nŏn'pȧ-rĕl'. See PRINTING.

NON'SUIT'. The termination of an action by entry of judgment against the plaintiff upon his failure to appear or prosecute the action, or because of his inability to sustain his case at the trial, in consequence of which the action is ended without a determination of the merits. Under the early common-law procedure a nonsuit was entered only on motion of the defendant when the plaintiff was in default in prosecuting his action, and if the latter wished to end the suit, he was obliged to resort to the procedure known as *nolle prosequi* or *retraxit*. However, in modern procedure, a plaintiff is sometimes allowed to end his action by nonsuit, in the discretion of the court, usually upon payment of costs. Under the various codes of procedure at the present time, the same result is effected by a discontinuance. Where the plaintiff fails to introduce sufficient evidence to make out a prima facie case, in many jurisdictions a nonsuit may be ordered by the court before the defendant has introduced any testimony whatever. But where the plaintiff does make out a prima facie case, even though the defendant's evidence appears to the court to dispose conclusively of the plaintiff's case, the court cannot grant a nonsuit against the objection of the plaintiff, as the latter is entitled to have the issue of fact in the case determined by a jury.

A nonsuit differs from a dismissal of the complaint or declaration only in that the latter is a broader term and may involve a determination of the merits of the action. A direction of verdict is also distinguishable from a nonsuit because it involves the merits of the controversy. It is therefore important whether an action is terminated by dismissal on the merits, verdict, or direction of verdict, in which cases the party against whom the court decides must appeal if he thinks the judgment erroneous; or whether a nonsuit is entered, as in the latter case the plaintiff can immediately commence a new action on the same state of facts. Consult the authorities referred to under PRACTICE. See ACTION; APPEAL; JUDGMENT; NOLLE PROSEQUI; VERDICT.

NOOKSAK. See SALISHAN STOCK.

NOORDEN, nōr'den (NOORDEN-HARKO), CARL H. VON (1858–). A German pathologist, born at Bonn and educated in medicine at Tübingen, Freiburg, and Leipzig (M.D., 1882). In 1885 he was admitted as privatdocent to the medical faculty of the University of Giessen, where he had been assistant in the medical clinic since 1883. In 1889 he became first assistant of the medical clinic at Berlin University, in 1894 was called to Frankfort-on-the-Main as physician in charge of the municipal hospital, and in 1906 was appointed professor of medicine at the University of Vienna, to succeed Nothnagel. Von Noorden made special researches in albuminuria in health, in metabolism, in diabetes, diseases of the kidney, dietetics, etc., and wrote on these subjects, some of his works appearing in English.

NOOTKA, no͞ot'kȧ. A name sometimes applied to a group of closely related tribes of Wakashan stock (q.v.) occupying the west coast of Vancouver Island, southern British Columbia, and including also the Makaw (q.v.), who conquered for themselves a territory upon the opposite coast of Washington. From their frequent repetition of the word *wakash* (good), Vancouver in 1792 called them Wakash Indians, whence their stock name Wakashan is derived. They are also frequently known as Aht, from the termination of the tribal names. For general characteristics and customs, see WAKASHAN STOCK.

NOOTKA SOUND. An inlet on the west coast of Vancouver Island, British North America, in lat. 49° 35′ N., long. 126° 34′ W. (Map: British Columbia, C 5). Its entrance is protected by an island of the same name, and the Sound can be entered on both sides of the island. It extends inland for 10 miles in a north-northeast direction, and affords good anchorage. According to some writers, the Sound was discovered by the Spaniard Don Juan Pérez in 1774; according to others, by the English navigator Capt. James Cook in 1778.

NOR'BERT, SAINT. See PREMONSTRATENSIANS.

NORD, nôr. The most northerly department of France. It is coterminous with the former Province of Flandre (French Flanders), and stretches along the Belgian frontier, with a shore line of 21 miles on the North Sea (Map: France, N., J 2). Area, 2228 square miles. It is watered by the Scheldt, Lys, and tributaries of the Meuse and Seine. It is exceedingly fertile and well cultivated, being next to Seine the most densely populated department of France. The chief agricultural products are wheat, oats, potatoes, sugar beets, tobacco, flax, and hops. Stock raising and fisheries are important, and the department is very rich in coal deposits. The Nord is also one of the foremost industrial departments, producing machinery, textiles, porcelain, glass, chemicals, and sugar. The chief of its many large cities are Lille, the capital, Dunkirk (its port), Roubaix, and Valenciennes. Pop., 1901, 1,866,994; 1911, 1,961,780. It was the scene of extremely heavy fighting in the war which began in 1914. See WAR IN EUROPE.

NORDAU, nôr′dou, MAX SIMON (1849–). An author of Hungarian birth, pathological critic of literature and of morals, and a prominent leader in the Zionist movement in Europe. (See ZIONISM.) He was born in Budapest of an educated Jewish family, July 29, 1849, studied medicine in the University of Budapest, taking his degree in 1873, and, after six years of travel through Europe, practiced in his native city for two years. Later he made Paris his residence, and he did some of his literary work in French. His earlier writings, chiefly for newspapers and showing something of his later censorious manner, were reprinted under the titles *Aus dem wahren Milliardenland* (1878), *Vom Kreml zur Alhambra* (1880), and *Paris unter der dritten Republik* (1881). Two years (1880–82) were spent in further medical study in Paris, where Nordau established himself in practice. In France and Germany his literary reputation began with *Konventionelle Lügen der Kulturmenschheit* (1884; 63d thousand, 1913; French trans., 1886; Eng. trans., *Conventional Lies of our Civilization;* 2d ed., 1895), a bold attack on the ethics of modern civilization in general, with particular treatment of the religious lie, or false reverence for the Bible; of the governmental lie, or the falsity of monarchy and aristocracy; of the economic lie, or the untruth of our social system; of the social lie, urging the falsity of conventional marriage laws, and not, as some of his critics have urged, a frenzied treatise against the white lies of society. In the same spirit was *Paradoxe* (1885; 8th ed., 1903; French trans., 1896; Eng. trans., *Paradoxes*, 1895), ironic rather than pessimistic in tone. Somewhat unfortunately, Nordau's fame in England and America rests almost altogether on the third of his satiric works, *Degeneration* (1893), from the German *Entartung*, a vigorous polemic against vice or abnormality and a eulogium of decency in literature and art, at times approaching prudery. The work was dedicated to Cesare Lombroso, and has for its theme the relation between genius and degeneracy. Nordau examines the work of art produced, and if it be immoral and foul, argues that the artist is therefore degenerate and no genius. The chief value to him of any work is ethical. At the opening of the European War in 1914 Nordau attacked Germany's action; later he turned against France. Nordau's other writings are: the novels *Die Krankheit des Jahrhunderts* (1889; Eng. trans., *The Malady of the Century*), *Gefühls-Komödie* (1891; Eng. trans., *The Comedy of Sentiment*, 1895), *Drohnenschlacht* (1897; Eng. trans., *The Drones Must Die*, 1897), *Morganatisch* (1904; Eng. trans., *Morganatic*), *Mahá-Rôg* (1905); *Seelenanalysen* (1892), stories; the plays *Neue Journalisten* (1880), with Ferdinand Gross, *Krieg der Millionen* (1882), *Das Recht zu lieben* (1893), *Die Kugel* (1894), and *Dr. Kohn* (1898); volumes of essays, *Zeitgenössische Franzosen* (1901) and *Von Kunst und Künstlern* (1905; Eng. trans., *On Art and Artists*, 1907); *Der Zionismus* (1902; Eng. trans., *Zionism*, with *Anti-Semitism* by G. Gottheil, 1905) and in the same field *Judentum in 19. und 20. Jahrhundert* (1910); *Märchen*, stories told to his small daughter (new ed., 1910; Eng. trans., *The Dwarf's Spectacles and Other Fairy Tales*, 1905); *Der Sinn der Geschichte* (1909; French trans., 1909; Eng. trans., *The Interpretation of History*, 1911). Consult: K. Bleibtreu, *Paradoxe der conventionellen Lügen* (6th ed., Berlin, 1888); B. Rüttenauer, *Zeitiges und Streitiges* (Heidelberg, 1895); N. M. Butler, *Regeneration: A Reply to Max Nordau* (New York, 1896).

NORDEN, nôr′den, EDUARD (1868–). A German classical philologist, born at Emden. He became professor in the University of Breslau and in 1906 was appointed to a chair at Berlin. His most important publications are a brilliant and comprehensive history of ancient prose style from the sixth century B.C. to the time of the Renaissance, entitled *Die antike Kunstprosa* (2 vols., 1898; 2d ed., 1909), and a fine edition, with introduction, notes, and appendices, of *Aeneid*, vi (1903). With A. Gercke he was supervising editor of *Einleitung in die Altertumswissenschaft* (3 vols., 1910–12; 2d ed., 1913); to volume i of this work he contributed also a discussion of "Römische Literatur." To *Die griechische und lateinische Literatur und Sprache* (3d ed., 1912) he contributed a discussion of "Die lateinische Literatur in Uebergang vom Altertum zum Mittelalter."

NORDENBERG, nôr′den-bârj, BENGT (1822–1902). A Swedish genre painter, born at Kompinkulla, Blekinge. For seven years employed as a house painter, he went in 1843 to Stockholm and, while still following his trade, frequented the Academy until 1851, when he proceeded to Düsseldorf. There he studied under Theodor Hildebrandt and in Paris (1857–58) under Couture. Then he visited Italy and finally settled at Düsseldorf. Much influenced by Tidemand, he chose his subjects almost exclusively from Swedish peasant life, which he depicted with a keen sense of observation and deep feeling. Prominent among such popular scenes are: "Communion in a Village Church" (1856, National Gallery, Christiania); "The Organist" (1861, Leipzig Museum); "Levying the Tithe in Skåne" (1865), his best work, and "Wedding Procession in Värend" (1873), both in the Stockholm Museum.

NOR′DENFELT MACHINE GUN. See MACHINE GUN.

NORDENSKIÖLD, nôr′*en*-shēld, NILS ADOLF ERIK, BARON (1832–1901). A famous geographer and explorer. He was born at Helsingfors, Finland, Nov. 18, 1832, and died Aug. 12, 1901, on his estate Dalbyö, Södermanland. Nordenskiöld entered the university of his native town in 1849, where he devoted himself to chemistry and mineralogy. In 1853 he studied particularly the iron and copper mines at Tagilsk in the Urals. Returning home, he published his first papers, dealing with the minerals and mollusca of Finland, and received an appointment as curator of the mathematico-physical faculty. He was dismissed because he offered a banquet toast to which the Governor gave an obnoxious political significance. Visiting Berlin, he engaged in researches in mineral analysis at Rosc's laboratory. In 1857 he obtained the Alexander traveling stipend from his university, together with his degree as master and doctor, and prepared for a geological expedition to Siberia and Kamchatka. Another unlucky toast gave offense to the Russian Governor-General, drove the offender from the country, and deprived him of ever holding office in the university. This disqualification lasted until 1862. Nordenskiöld settled in Stockholm in 1857, and Sweden became his adopted country. During 1858 he made his first voyage to Arctic seas with the Swedish geologist Torell, and made valuable discoveries of the remains of Tertiary plants in Spitzbergen. After his return he was appointed professor and director of the Royal Museum, Stockholm. In 1861 he made a second expedition with Torell and surveyed the northern part of Spitzbergen. Nordenskiöld led an expedition to Spitzbergen in 1864, completing a preliminary survey for the arc of the meridian, mapping southern Spitzbergen, and collecting data as to fauna and flora. His third expedition was a north-polar quest in 1868, when in the *Sofia* he reached lat. 81° 42′ N. A visit to Greenland in 1870 enabled him to formulate a theory as to the ice sheet that once covered part of Europe by his examinations of similar formations upon the Greenland ice cap. In his Spitzbergen expedition of 1873 he discovered what he supposed to be cosmic dust on polar ice; he also surveyed part of North East Land. Two successful voyages to the Yenisei, Siberia, via the Kara Sea (1875 and 1876) convinced him that it was practicable to accomplish the long-sought Northeast Passage (q.v.). This voyage he made (1878–80) in the *Vega*. He was obliged by ice to winter near Cape Szerde Kamen, in lat. 67° 7′ N., long. 173° 23′ E., when within easy distance of Bering Strait, which he passed in July, 1879. For this achievement the King of Sweden and Norway conferred upon Nordenskiöld the rank of Baron in the Swedish peerage. In 1883 he made his last expedition, to the east coast of Greenland. Nordenskiöld, a liberal in politics, sat in 1870–72 in the Lower House of the Swedish Diet. He discovered uranium in many varieties of coal, and showed that fresh water could be found anywhere in Sweden at a depth of 100 feet through the Archean rocks. He was elected member or honorary member of over 80 foreign scientific societies. His principal works, as translated into English, are: *The Voyage of the Vega around Asia* (1881); *The Second Swedish Expedition to Greenland* (1885); *Facsimile Atlas to the Early History of Cartography* (1889); *Periplus* (1897). He published also *Vega expeditionens vetenskapliga iakttagelser* (5 vols., 1882–87). Consult *The Arctic Voyages of Adolf Erik Nordenskiöld*, edited by Alexander Leslie (London, 1879); also Hulth, *Swedish Arctic and Antarctic Explorations 1758–1910* (Upsala, 1910).

NORDENSKIÖLD, Nils Erland Herbert, Baron (1877–). A Swedish traveler and ethnologist, born in Stockholm, son of N. A. E. Nordenskiöld. He was educated at Upsala, was connected with the Museum of Natural History at Stockholm (1906–08), and became director of the ethnographic division of the Göteborg Museum (1913). He made journeys of discovery in Patagonia (1899), in Argentina and Bolivia (1901–02), in Peru and Bolivia (1904–05), in Bolivia (1908–09), and in 1913 in the interior of South America. From these journeys he brought home large collections for the museums in Stockholm. Nordenskiöld published: *Från högfjäll och urskogar* (1902); *Indianlif i El Gran Chaco* (1910; Ger. trans., 1912); *Indianer och hvita* (1911); *Sydamerikas indianer* (1912); besides numerous articles in scientific periodicals. In 1912 he was awarded the Loubat prize and the Wahlberg gold medal.

NORDENSKJÖLD, (Nils) Otto (Gustaf) (1869–). A Swedish scientist and polar explorer, born at Sjögelö, Småland, and related to the explorer Nordenskjöld. He was educated at Upsala, where he became docent in mineralogy and geology in 1894 and where he gained the doctorate (1894). In 1905 he became professor of ethnology and geography at Göteborg. In 1895–97 he made a scientific expedition to the Strait of Magellan and Patagonia and in 1898 an expedition to Alaska. As a geologist he participated in the exploration (1900) of Christian IX Land, East Greenland, and later (1909) investigated the districts of Holstensborg and Ivigtut, southwest Greenland. He commanded the Swedish Antarctic expedition (1901–04) which added Oscar II Land to the known area of Palmer (Graham) Land, discovered Crown Prince Gustav Channel, and made important contributions to Antarctic knowledge, especially in geology. Nordenskjöld was honored by various scientific societies at home and abroad. Apart from his many technical memoirs, his most important publications are *The Geology and Physical Geography of East Greenland* (1908) and *Antarctica* (1904, in six languages).

NORDERNEY, nôr′dĕr-nī′. The most important of the East Friesian Islands, lying off the northwest coast of Germany and belonging to the Prussian Province of Hanover (Map: Prussia, B 2). It is 8 miles long, about 1 mile wide, and covered with dunes 50 to 75 feet high. The island is a popular German sea-bathing resort, visited annually by over 42,000 persons. The village at the west end is protected by a large sea wall. It has a handsome Konversationshaus with a number of sanatoriums, a museum, and a national hospital for children. A large lighthouse stands in the centre of the island. The chief occupation of the inhabitants is fishing. Permanent pop., about 4300.

NORDHAUSEN, nôrt′hou′zen. A city in the Province of Saxony, Prussia, on the Zorge, 38 miles north-northwest of Erfurt, on the southern edge of the Harz Mountains (Map: Prussia, D 3). The church of St. Blasius with paintings by Lucas Cranach, the Roman Catholic late Gothic cathedral, the mediæval town hall, the museum of antiquities, and numerous monuments, are worthy of note. It has extensive distilleries and breweries, and large manufactures of tobacco, chemicals, leather, carpets, textiles, chicory, metal goods, parquetry flooring, marble work, bricks, sugar, and machinery. There is important trade in grain, yarn, cotton goods, corned beef, ham, pork, and sausages. Pop., 1900, 28,500; 1910, 32,564. Nordhausen is mentioned in the tenth century, and was made a free Imperial city in 1253.

NORDHEIM, Otho of. See Otho of Nordheim.

NORDHOFF, nôrd′hôf, Charles (1830–1901). An American journalist, descriptive and miscellaneous writer, born in Erwitte, Westphalia. He came to America in 1835, was educated in Cincinnati, and was for nine years at sea, in the navy and merchant service; from 1853 to 1857 in various newspaper offices; was then employed editorially by the Harpers (1861), and for the next 10 years on the staff of the New York *Evening Post*. From 1871 to 1873 Nordhoff traveled in California and visited Hawaii. He then became Washington correspondent of the New York *Herald*. Noteworthy among his books are: *Man-of-War Life*, largely autobiographical (1855); *The Merchant Vessel* (1855) and *Whaling and Fishing* (1856; new ed., 1903), both the result of personal experience, as was also *Nine Years a Sailor* (1857); *Secession Is Rebellion* (1860); *The Freedmen of South Carolina* (1863); *America for the Working Men* (1865); *Politics for Young Americans* (1875), perhaps the best known and most useful of his books; *The Communistic Societies of the United States* (1875); *God and the Future Life* (1881); *Peninsular California* (1888). Nordhoff died in California in July, 1901.

NOR′DICA, Lillian (1859–1914). An American soprano, born at Farmington, Me., her real name being Lillian Norton. She was a pupil of the New England Conservatory and of John O'Neill, appearing as a church soloist in Boston in 1876. Then followed two years of successful concert work, on the conclusion of which she accompanied Gilmore's Band to Europe. Later she took up the study of opera with San Giovanni, who gave her her stage name, and her operatic début was made at Brescia, Italy, in *La Traviata*. Madame Nordica was an earnest student and possessed considerable dramatic feeling, but it was the combination of a magnificent voice and a pleasing presence that won her an immediate success. After touring Germany and Russia she appeared in 1881 in Paris, where her triumph was absolute. Her marriage to Frederick A. Gower in 1883 was unhappy, but three years later, while she was suing for a separation, Mr. Gower ascended in a balloon and never was seen again. In 1896 Madame Nordica married an Hungarian tenor, Z. F. Döme, eight years later was divorced, and in 1909 became the wife of George W. Young, an American banker. From 1887 to 1893 Madame Nordica was one of the principal stars of the Covent Garden season in London, and was recognized as unsurpassed in coloratura parts, becoming especially famous as Marguerite in *Faust*. But her ambition would not let her rest there. After having studied the part of Elsa with Madame Wagner and Julius Kniese, she won such praise at the Bayreuth festival of 1894 that she was engaged in 1895 for the great Wagner rôles at the Metropolitan Opera House in New York. Her success in these parts caused her to abandon practically all other rôles, and her subsequent triumphs in Germany, France, and England were achieved in Wagner's works. During the season 1907–08 she was a member of Hammerstein's Manhattan Opera. After that she sang only occasionally in opera, as in 1912 with the Boston Opera Company, preferring to appear in concert under her own management. Her last tour, beginning in 1913, was to have taken her around the world, but as a result of exposure when the Dutch steamer *Tasman* went ashore, she contracted pneumonia and died on May 10, 1914, at Batavia, Java.

NÖRDLINGEN, nẽrt′lĭng-*e*n. A town in the western part of Bavaria, Germany, on the Eger, 39 miles northwest of Augsburg (Map: Germany, D 4). It is an ancient town with walls and towers. The Gothic St. George's Church and the late Gothic Rathaus, with a collection of old German pictures and fine mural paintings, are worthy of mention. The town has a Realschule and a fine library. Among the manufactures of Nördlingen are furniture, linen, woolen, and leather goods, carpets, soap, cement, bank safes, and agricultural implements. There are also marble yards and nurseries. Nördlingen is mentioned for the first time about 900, and became an Imperial city under the Emperor Frederick II in 1215. The town was the scene of two battles during the Thirty Years' War. In the first, fought on Aug. 27 (new style, Sept. 16), 1634, the Protestant army of Bernhard of Weimar and the Swedes under General Horn were overwhelmed by a superior force of Imperial troops under Ferdinand, the King of the Romans. This was the first defeat of the Swedes on German soil, and its effect was the delivery of south Germany from the foreigner. The second battle, which was fought on Aug. 3 (13), 1645, between the French and the Imperial troops, resulted in the defeat of the latter and the death of their commander, General Mercy. Pop., 1900, 8299; 1910, 8705.

NORDRAAK, nôr′drąk, Rikard (1842–66). A Norwegian composer, born at Christiania. In Berlin he studied piano with Kullak and composition with Kiel. Very early he turned to the study of Norwegian folk songs and collected a considerable number of them. His compositions, which show the influence of this national music, had raised great hopes that he would become the founder of a new national school, when death cut short his promising career. Fortunately he met Grieg (q.v.) in 1864, pointed out to the latter the wonderful possibilities of their national music, and inspired him to devote his genius to the cultivation of a specifically Norwegian art. Nordraak composed the music for the national hymn *Ja, vi elsker dette landet*, which was written by his cousin Björnson. He died in Berlin. His compositions consist of incidental music to Björnson's *Maria Stuart* and *Sigurd Slembe*, some piano pieces, and about a dozen characteristic songs.

NOREEN, nṓ-rān′, Adolf Gotthard (1854–). A Swedish philologist, born at Ostra Emtervik, Vermland. After graduating from the University of Upsala in 1873 and gaining the doctorate in 1877, he became a privatdocent there and in 1887 professor of the Scandinavian languages. Among his principal publications are: *Aeldre Västgötalagen* (1876); *Altisländische und altnorwegische Grammatik* (2 vols., 1884; 3d ed., 1903; abridged ed., 1905); *Abriss der urgermanischen Lautlehre* (Strassburg, 1894); *Altschwedische Grammatik mit Einschlus des Altgutnischen* (1898); *Vort språk* (Our Language) (9 vols., 1903 et seq.); *Spridda studier* (3 vols., 1895–1913). Noreen contributed the article on the Scandinavian languages to Paul's *Grundriss der Germanischen Philologie*, and is the author of a number of articles published in the *Arkiv för Nordisk Filologi*, of which he became editor. He holds a high place among European philologists.

NOREN, nŏ′*ren*, HEINRICH GOTTLIEB (1861–). An Austrian composer, born at Gratz. Having completed his violin study under Massart at Paris, he filled various positions as concert master in Belgium, Spain, Russia, and Germany. In Berlin he took up the study of composition with Gernsheim, and after the completion of that course settled in Krefeld, where he established a conservatory in 1896. In 1902 he returned to Berlin as professor in Stern's conservatory. As a composer he did not attract wide attention until 1907, when his variations for orchestra, *Kaleidoskop*, op. 30, scored an emphatic success at the meeting of the Tonkünstlerverein in Dresden. His other works include a symphony in B minor and a serenade for orchestra, a piano trio, a suite for violin and piano, compositions for violin and 'cello, male choruses, and piano pieces.

NORFOLK, nôr′fạk. A maritime county of England, bounded north and east by the North Sea, west by Cambridgeshire, and south by the County of Suffolk (Map: England, G 4). Area, 2053 square miles. Much of the level land near the coast has been reclaimed from the sea. Norfolk is chiefly an agricultural, stock and poultry raising county. There are manufactures of textiles. The principal rivers are the Ouse, Yare, and Bure. Capital, Norwich. Pop., 1901, 476,553; 1911, 499,116. Consult *Victoria History of the County of Norfolk*, edited by Doubleday and Page, vols. i–ii (London, 1901–06), and W. A. Dutt, *Norfolk and Suffolk Coast* (New York, 1910).

NORFOLK. A city in Madison Co., Neb., 75 miles southwest of Sioux City, on the Elkhorn River and on the Chicago and Northwestern and the Union Pacific railroads (Map: Nebraska, G 2). It is situated in a rich farming and stock-raising district and is an important commercial centre. The industrial establishments include large flour and cereal mills, packing houses, bottling works, creameries, concrete-block, threshing-machine, and washing-machine factories, extensive nurseries, a planing mill, and division headquarters and shops of the Northwestern System. The Norfolk Hospital for the Insane, a State institution, is situated here and also a Federal courthouse, a public library, a park, and a United States Weather Bureau station. There are municipal water works. Pop., 1900, 3883; 1910, 6025.

NORFOLK. The second largest city of Virginia, and a port of entry, in Norfolk County, 68 miles in a direct line, and 116 by water, southeast of Richmond, on the Elizabeth River, an arm of Chesapeake Bay, opposite Portsmouth (Map: Virginia, H 5). Norfolk is the terminus of many transatlantic, coastwise, and interior steamship lines, the Albemarle and Chesapeake and the Dismal Swamp canals affording additional means of communication with inland towns. The railroad facilities comprise the Atlantic Coast Line, the Seaboard Air Line, the Chesapeake and Ohio, the Virginian, the Norfolk and Western, the Norfolk Southern, the New York, Philadelphia, and Norfolk, and the Southern. Norfolk has an area of about 7½ square miles, and is irregularly laid out on level ground. The more prominent buildings include the customhouse, the city hall, St. Vincent de Paul, Norfolk Protestant, and Sarah Leigh hospitals, the post office, the Citizens' Bank, Cotton Exchange, City Market, Bank of Commerce, and Board of Trade and Law buildings. St. Paul's Church is of historic interest, having been built in 1737. The city maintains a Carnegie library and has several private secondary schools, among which are Norfolk Academy, one of the oldest preparatory schools in the South, and the Norfolk Mission College (United Presbyterian), an institution for colored students. There are three beautiful public parks. The Norfolk Navy Yard is at Portsmouth (q.v.). Norfolk is the see of a Protestant Episcopal bishopric. There are several summer resorts near by, notably Old Point Comfort, Pine Beach, Ocean View, Willoughby Beach, and Virginia Beach. Norfolk is one of the most important Southern ports. The harbor is commodious, accessible for the largest ships, has a channel 30 feet deep, and is well protected, the defenses including forts Wool and Monroe (q.v.). Norfolk and Portsmouth together constitute a Federal customs district, its foreign trade in merchandise in 1913 comprising exports valued at $15,611,091 and imports aggregating $2,111,944. The commerce of the port is principally in peanuts, in which it leads the world, lumber, coal, grain, cotton, oysters, vegetables, and fruit. One of the largest coal stations in the world is located here, at the Lamberts' Point terminal of the Norfolk and Western Railroad. The terminal, which comprises three coal piers and two warehouses, handles about 40 per cent of the coal delivered to vessels in the harbor. An average of 400 cars per day is received, and the plant has a maximum rating of 90 tons of coal per minute. Norfolk is developing rapidly also as an industrial centre, its manufactures, according to the thirteenth census, representing capital to the amount of $10,744,000 and having a production valued at $10,341,000. The most important industrial establishments are fertilizer works, lumber, hosiery, knitting, cotton, silk, and oil mills, carriage and wagon shops, foundries and machine shops, a steel shutter and blind manufactory, ship and boat building yards, creosoting works, agricultural-implement works, tobacco and cigar factories, etc. Norfolk spent in 1913 for maintenance and operation about $1,102,000, the principal items being: for streets, $93,000; for water, $92,000; for the police department, $161,000; for schools, $272,000; for the fire department, $128,000. The city's income in that year was $3,247,000. There are municipal water works, built in 1872 and acquired by the city in the following years. Pop., 1860, 14,620; 1880, 21,966; 1890, 34,871; 1900, 46,624; 1910, 67,452; 1914 (U. S. est.), 86,540.

Organized as a town in 1682, Norfolk was incorporated as a borough in 1736 and was chartered as a city in 1845. Its charter was revised in 1882 and 1884 and a new charter was granted in 1906. This, as amended in 1908, vested the executive powers in a mayor, elected for four years, and a board of control of three members; while the legislative functions are vested in a common council and a board of aldermen consisting of 40 members. On Jan. 9, 1906, Berkely, a suburban city, was annexed and now forms a part of Norfolk. On Jan. 1, 1776, the city was bombarded and set on fire by the English under Lord Dunmore, and nine-tenths of the buildings were destroyed. In April, 1861, General Taliaferro, at the head of a body of Virginia troops, entered the city, and soon afterward the navy yard was fired by order of the Federal commandant, but comparatively little damage was done. Until May, 1862, when the Federal forces took possession, the city was the chief naval station of the Confederacy. Consult: W. S. Forrest, *Historical and Descriptive Sketches of Norfolk and Vicinity* (Philadelphia, 1853); H. W. Burton, *The History of Norfolk, Virginia* (Norfolk, 1877); Lamb, *Our Twin Cities of the Nineteenth Century* (ib., 1887–88).

NORFOLK, Dukes of. See Howard.

NORFOLK ISLAND. An isolated island in the Pacific Ocean and under the jurisdiction of the government of New South Wales. It is about 400 miles northwest from New Zealand and 1100 northeast from Sydney; lat. 29° 3′ S., long. 167° 58′ E. (Map: Australasia, J 5). It has an area of 10 square miles and a circumference of 20 miles. The coasts are high and steep and the island has an average elevation of about 400 feet, rising in Mount Pitt to a height of 1050 feet. In its forests the most conspicuous tree is the magnificent Norfolk Island pine (*Araucaria excelsa*). In 1911 the population was 985 (568 males, 417 females), and the greater percentage were Norfolk communists. The majority of the Norfolk community are the descendants of the mutineers of the *Bounty*, who in May, 1856, were transferred hither by the British government from Pitcairn Island (q.v.). The island has been administered since 1903 by an executive council of a President, two elected and four appointed members. The chief magistrate must reside on and exercise general supervision of the affairs of the island. The island was discovered by Captain Cook in October, 1774, and was used by New South Wales as a penal settlement down to 1851. Although administered by the government of New South Wales, the island is not politically connected with the Commonwealth of Australia. Consult B. E. Grimshaw, *Fiji and its Possibilities* (New York, 1907).

NORFOLK ISLAND PINE. See Araucaria.

NORFOLK SPANIEL. See Spaniel.

NOR'ICUM. A province of the Roman Empire, corresponding to Styria, Carinthia, parts of Upper and Lower Austria and Bavaria, and Salzburg (Map: Rome, D 2). It was bounded on the north by the Danube, on the east and the south by Pannonia (on the south also by Illyricum and Cisalpine Gaul), on the west by Rhætia. The region is mountainous, the Noric Alps stretching through the centre of the province. The chief rivers were the Œnus (modern Inn), Dravus (Drave), and Murius (Mur). The chief town was Noreia (Neumarkt), mentioned by Cæsar in his *Commentaries*. The province was subdued by the generals of Augustus (c.13 B.C.). The Romans obtained iron and salt from the region, and, it is said, gold. The Noricans, a warlike people, are thought to have been originally Illyrians, who later became subject to various Celtic or Gallic tribes, especially the Taurisci. The district became the starting point for Celtic inroads into Italy. For the civilization here in prehistoric times, see the article Hallstatt Epoch. W. Ridgeway, *The Early Age of Greece*, vol. i (1905), has argued that the Homeric Achæans came originally from Noricum and its neighborhood. Consult also M. B. Peaks, *The General Civil and Military Administration of Noricum and Rhætia* (Chicago, 1907).

NORINAYA, Motoori. See Motoori Norinaya.

NOR'MA. An opera by Bellini (q.v.), first produced at Milan, Dec. 26, 1831; in the United States, Sept. 20, 1843 (New York).

NOR'MAL. A town in McLean Co., Ill., 61 miles northeast of Springfield, on the Illinois Central and the Chicago and Alton railroads (Map: Illinois, G 4). It is the seat of the Illinois State Normal University and of the State Soldiers' Orphans' Home. Nursery stock, fruit, and vegetables are extensively cultivated in this vicinity, and Normal is also an important horse market. There are municipal water works. Pop., 1900, 3795; 1910, 4024; 1915, 4582.

NORMAL (Lat. *normalis*, according to rule, from *norma*, rule, carpenter's square). In mathematics, a straight line perpendicular to a tangent at the point of its contact with the given curved line or surface. The evolute (q.v.) of a curve may be considered as the envelope of the normals to the given curve. This relation is evident since the centres of curvature of which the evolute is the locus are the intersections of normals at adjacent points of the curve; e.g., the semicubical parabola, an evolute of the common parabola, is an envelope of the normals to this curve. See Parabola.

NORMAL COLLEGE, now **HUNTER COLLEGE, OF THE CITY OF NEW YORK.** An institution established in 1870 for the training of women. Its board of trustees is composed of the members of the board of education and the president of the college. None but residents of the city are admitted. Tuition, textbooks, and other supplies are furnished without cost to students. The course of study requires four years of academic work based upon a four years' high-school course, and leads to the A.B. degree. One of the chief aims of the institution is to encourage and prepare young women with a liberal college education to engage in the work of teaching in both the elementary and secondary schools of the city. The complete organization known as Hunter College comprises, in addition to the college proper, and separate from it as regards instruction and direct supervision, a high school and a model elementary school, both of which are used for the training of teachers. It also has a school for the training of kindergartners. The college had, in 1915, 1400 students and a teaching staff of 121 members; the high school had 1200 pupils and a staff of 68 members; the model school, 700 pupils and a staff of 22 members; in the school for kindergartners there were 67 students and 4 teachers. Until April 4, 1914, the college was called the Normal College of the City of New York; on that date its name was changed, by act of the Legislature, to Hunter College of the City of New York, in honor of its first president, Dr. Thomas Hunter. The president in 1915 was George Samler Davis, LL.D.

NORMAL SCHOOL. In general, any institution for the professional training of teachers. In a special sense the term, which is a direct translation of the French *école normale*, is used to designate a school for the training of elementary school teachers, carried on usually by the state, sometimes by private enterprise, which receives students who have had more or less high-school training and gives them academic and professional courses. Normal schools in some form are now found throughout the civilized world, usually as integral parts of the systems of public education in the several countries or states. The earliest successful normal school appears to have been that established by La Salle in 1685 at

Rheims, France. Not until early in the nineteenth century, however, were public normal schools established in France generally, although the famous but short-lived Ecole Normale was founded by the Convention in 1795 and had such distinguished scholars as Lagrange and Laplace on its faculty. In Germany the first attempt to provide professional training for teachers is attributed to August Hermann Francke, who in 1704 founded the normal school at Halle in connection with the institution which still bears his name. During the reign of Frederick the Great, and especially during the period after the defeat at Jena in 1806, many normal schools (or teachers' seminaries, as they are called) were founded, especially in Prussia. There were in 1913 in Prussia alone no fewer than 186 normal schools for men and 26 for women. In England the establishment of training colleges, as the normal schools are called, dates back to the monitorial system (q.v.) of Bell and Lancaster (qq.v.) at the beginning of the nineteenth century, and received its further encouragements after the grant of public money in 1833. The development was slow, however, owing to the rise of the pupil-teacher or apprenticeship system of training. Generally the training colleges were established and maintained by denominational societies, but more recently they have been established in connection with the universities and also by local municipal authorities. They give a course of from two to four years to students coming from secondary schools. The British system has been successfully extended to Canada, Australia, and South Africa. In America the movement for the establishment of normal schools dates back to the twenties of the nineteenth century, and had among its advocates William E. Russell, Thomas Gallaudet, and Prof. J. L. Kingsley of Yale. The first normal school as such was probably that conducted privately by Samuel R. Hall at Concord, Vt., in 1823. The first public normal schools were founded in Massachusetts in 1839 and 1840 at Lexington, Barre, and Bridgewater. They were the result, in particular, of the combined efforts of the following men towards securing higher qualifications among teachers: James G. Carter, the "father of normal schools" in America, who for more than 12 years, from 1824 on, constantly agitated for their establishment and as a member of the Legislature was influential in securing the establishment of a State board of education (1837) and the passage of the Normal School Act in 1838; Charles Brooks, who visited Prussian normal schools in 1834 and disseminated the ideas he had gained during the following two years; Henry Barnard, the distinguished pioneer in educational journalism and educational progress; Edmund Dwight, who offered the Legislature $10,000 on condition that it should appropriate an equal amount to promote the preparation of teachers for the common schools; and especially Horace Mann, who as secretary of the State Board of Education did more than any other man to develop the normal-school idea and to make it effective. The course in these early normal schools included (1) the science and art of teaching the common-school branches; together with (2) the subject matter of these branches, and, if possible, of such higher studies also as algebra, geometry, general history, natural philosophy, and astronomy; and (3) practice teaching in a model school. In the 30 years following the establishment of these schools no fewer than 15 leading normal schools of the highest type were established in as many different States; and many more of inferior quality. In 1912–13 there were in the United States 230 public and 54 private normal schools, with a total enrollment of 94,456 students.

In standards and courses of study the normal schools of the United States vary widely, students being admitted in different parts of the country from elementary or high schools. The length of the courses varies accordingly, and again differs widely in different parts, from one to five years according to the previous preparation of the students. The minimum entrance requirements are indicated by the subjects in which examinations are required for admission, viz., arithmetic, geography, grammar, composition, orthography, American history, civil government, physiology and hygiene, and penmanship. Students presenting these qualifications may be graduated on completion of a two-year course, including one year devoted to the theory and practice of teaching. The more advanced courses include high-school subjects, methods in elementary subjects, psychology, the science of education, history of education, child study, and practice teaching. Many normal schools offer special courses for the training of kindergarten teachers.

More recently a new type of training of elementary school teachers has developed in the high-school normal-training classes which are spreading rapidly and promise to be highly successful. In New York State they have existed for some time, and are connected historically with the practice of training teachers in academies. Since 1899 these have been under the supervision of the Department of Public Instruction. The system is found in Wisconsin (1889), Nebraska (1907), Virginia (1909), and several southern States among others. The system aims in particular to train teachers for rural schools in a course of one year, usually the last of a four-year high-school course, and consists of a review of common-school subjects, psychology, school management, and practice in teaching. In 1912–13 such courses were given in 931 public and in 268 private high schools to a total of 27,051 pupils.

The name "normal college" has been given to certain institutions, like the New York State Normal College and the Michigan State Normal College, which require a full high-school course for admission, and which, in addition to more extended professional courses than are usually offered by normal schools, undertake the preparation of teachers for secondary schools. Such institutions are empowered to grant pedagogical degrees.

The establishment of university chairs and departments of education, a movement of the greatest significance for education, has been the growth of the past 50 years. Its beginnings were weak and tentative. In America the honor of the earliest attempts is due to President Francis Wayland, at Brown University (in 1850), to Horace Mann, at Antioch College (in 1853), and to President Barnard, at Columbia College (in 1858). The first chair of education to be established on a solid basis in an American college or university was that at the University of Michigan under President Angell in 1879, since which time such departments have been established in large numbers throughout the country.

The rapid growth of large cities has created a demand for trained teachers, which all the agencies thus far mentioned have proved entirely inadequate to supply. This need has been met in part by the establishment of city training schools. The Brooklyn Training School, organized by Superintendent William H. Maxwell, is a type of the best of such schools. It receives on examination the graduates of public high schools, and prepares them to be teachers in elementary schools by a course in the history of education, pedagogy, methods of teaching elementary subjects, etc. A half year is also spent in substituting for pay in the public schools.

For the benefit of teachers in the service, particularly those who have had little or no professional training, teachers' institutes have been organized and have been a feature of American education for the past 60 years. The teachers' institute is a short-time school, whose aim is to give stimulus and guidance to teachers in personal knowledge and skill and in general culture. Its curriculum usually includes methods of teaching and school management, the subject matter of some branch or branches of literature, science, or art, together with general lectures for culture or recreation. The method of instruction is usually by lectures; but the tendency is increasingly to have lessons assigned and to conduct recitations as well as to present model lessons with subsequent discussion and criticism. This movement is really accompanied by an extension of the duration of the institutes. The instruction is given either by a regular institute corps, as in the State of New York, or by a special corps organized for each institute, as in Pennsylvania. See NATIONAL EDUCATION, SYSTEMS OF; NORMAL COLLEGE; PEABODY COLLEGE FOR TEACHERS; SUMMER SCHOOL; TEACHERS COLLEGE.

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NOR'MAN. A city and the county seat of Cleveland Co., Okla., 18 miles south of Oklahoma City, on the Atchison, Topeka, and Santa Fe Railroad (Map: Oklahoma, D 3). It is the seat of the University of Oklahoma, which was opened in 1892, and of an insane asylum. There are manufactures of cottonseed oil, flour, etc., and some trade in the products of the fertile agricultural and fruit-growing region adjacent. The water works are owned by the municipality. Pop., 1900, 2225; 1910, 3724.

NORMAN, SIR HENRY (1858-). An English traveler and author, born in Leicester. He was educated in France, at Harvard, and at Leipzig. For some years he was on the *Pall Mall Gazette*, and later he became assistant editor of the *Daily Chronicle*, from which he withdrew in 1899. Norman founded in 1902, and for a time edited, the (English) *World's Work*. He traveled extensively in the United States and Canada, Japan, China, Siberia, Korea, India, Siam, the Malay Peninsula, and Egypt. From 1900 to 1910 Norman was a Liberal member of Parliament for South Wolverhampton and afterward for Blackburn; in 1910 he served as Assistant Postmaster-General and later was chairman of important committees. Shortly after his graduation from Harvard he was prominent in the movement that resulted in the purchase by New York State of land on the American side of Niagara Falls to form a public reservation. He was knighted in 1906 and made Baronet in 1915. His works include: *The Real Japan* (1892); *The Peoples and Politics of the Far East* (1895); *The Near East* (1899); *All the Russias* (1902; new ed., 1914); *Delhi: An Account of the Great Mutiny in India* (1902); *Thoughts I Met on the Highway* (1905).

NORMAN, SIR HENRY WYLIE (1826-1904). A British soldier and administrator, born in London. He became a cadet in the East India Company's Bengal army in 1844, participated in the Second Sikh War in 1848-49, accompanied Sir Charles Napier's expedition to Kohat Pass in 1850, and shared in other expeditions. After the Indian Mutiny broke out he was adjutant general of Sir Colin Campbell's force which besieged Delhi and relieved Lucknow. Participating in the civil government of India, he was military secretary in 1862-70, a member of the Governor-General's Council in 1870-77, and a councilor of India in 1878-83. He served as Governor of Jamaica in 1883-89 and of Queensland in 1889-95. Because of poor health he declined in 1893 the governor-generalship of India. He was made K.C.B. in 1873 and was promoted to major general in 1869, general in 1882, and field marshal in 1902.

NORMAN ARCHITECTURE. A style originated and chiefly used by the Normans and a subdivision of Romanesque (q.v.) architecture, under which its principal monuments are described. Soon after their conquest of the north of France (912 A.D.), during which they had indulged in wholesale burning of churches and monasteries, the Normans began to rebuild religious structures on a larger scale, as a consequence of their conversion. They expanded the dimensions, while to a great extent at first retaining the style of the buildings they found in France. They seem also to have borrowed some of their ideas from the Rhine and from Lombardy, especially the use of vaulting. They carried the architecture of their province and of France with them to England with the Conquest, and even to south Italy, where they established a great kingdom in the eleventh century. The leading characteristics of their style were great size, simplicity, and massiveness. They adopted the old basilical plan of central and side aisles and semicircular apse, though the square apse was sometimes used in England towards the close of the style. They seized on the tower as a distinguishing feature and developed it as their style progressed, placing one usually on each side of the façade and frequently also a tower or high lantern over the crossing of nave and transepts. The ornaments are simple and of great variety, but the most common and distinctive are the zigzag, billet, chevron, nailhead, etc. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door arch is occasionally filled with sculpture. The nave arches are carried sometimes on heavy single pillars in English examples, but more frequently, especially as the style advanced, on clustered piers or on alternate clustered and round piers. Owing to the great size of the buildings, the architects were unable at first to vault the central aisle, which, accordingly, had usually a wooden roof, the side aisles only being vaulted. In France, however, vaulting of the nave became common after 1100, though not until later in England.

The masonry was at first rude, the joints being large, and the stones hewn with the axe; but in the twelfth century the technique improved with the use of the chisel. The style prevailed from about the beginning of the eleventh century until the rise of Gothic architecture in the thirteenth. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William the Conqueror. The chapel in the white tower of the Tower of London is the earliest example of pure Norman work in England. The development of vaulting in the French section of the Norman school furnished the models for the development of the Gothic method of ribbed vaulting, while the English section remained stationary and maintained itself longer than in France, until early in the thirteenth century. The Normans, while good builders, did little in sculpture, painting, or the minor arts.

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NOR'MANBY, CONSTANTINE HENRY PHIPPS, MARQUIS OF (1797–1863). An English statesman and author. He was the eldest son of the first Earl Mulgrave. He was educated at Harrow and at Trinity College, Cambridge, and became member of Parliament for Scarborough in 1818. Although of a Tory family, he acted with the Liberals; his first speech was in favor of the political claims of the Roman Catholics, and his second advocated Lord John Russell's proposals for parliamentary reform. He succeeded to the title in 1831 and soon after was made Governor of Jamaica, where he successfully executed the act for the emancipation of the slaves and suppressed without loss of life a mutiny of the soldiers. Returning to England, he succeeded the Earl of Carlisle as Lord Privy Seal in 1834. He was Lord Lieutenant of Ireland (1835–39) and displayed an impartiality which won the approbation of O'Connell. He was made Marquis at the coronation of Victoria and was Colonial Secretary for a short time in 1839, but was soon transferred to the Home Department, where he remained till 1841. From 1846 to 1852 he was Ambassador at Paris and from 1854 to 1858 at Florence. He published *A Year of Revolution* (1857), containing his personal observations at Paris, and a number of novels, including: *Matilda* (1825); *Yes and No* (1828); *The Contrast* (1832).

NOR'MAN CROSS. See CROSS.

NOR'MANDY (Fr. *Normandie*). A former province of France, bordering on the English Channel. Its capital was Rouen. It is comprised in the modern departments of Seine-Inférieure, Eure, Orne, Calvados, and La Manche. In the northeastern part of Normandy (formerly Upper Normandy) are the towns of Rouen, Dieppe, Havre, Harfleur, Honfleur, Lisieux, Evreux, Yvetot; in the southern and western parts (Lower Normandy) are Caen, the chief town, Falaise, Saint-Lô, Bayeux, Coutances, Avranches, Granville, Alençon, and Cherbourg.

In the time of the Romans the region was included in Gallia Lugdunensis Secunda. Under the Frankish monarchs it formed a part of Neustria and came to be known as Normandy after Charles the Simple, in 911 (?912), had given it to Hrolf or Rollo, the leader of a band of Norse rovers (see NORMANS), as a fief of the French crown. From Hrolf (baptized under the name of Robert) and Gisela, the daughter of Charles the Simple, sprang the dukes of Normandy, of whom Richard I (grandson of Hrolf) vigorously maintained his authority against his liege lords, Louis IV and Lothaire. William II, son of Robert II le Diable, became Duke of Normandy in 1035 and in 1066 established a Norman dynasty on the throne of England (see WILLIAM I), thereby politically uniting Normandy with the latter country. In 1077 his eldest son, Robert, wrested Normandy from him, but it was again united to England under Henry I in 1106. With this monarch the direct male line became extinct. Henry II, the son of Henry I's daughter, Matilda, after the death of Stephen of Blois, obtained in 1154 the government of England and Normandy; but in the reign of his son, John, Normandy was conquered by Philip Augustus of France (1202–04). It remained a portion of the French monarchy for over two centuries, save when conquered by Edward III in 1346; but after the battle of Agincourt (1415) it was reconquered by the English, who held it till 1449. The Channel Islands, which were once a part of Normandy, have remained in possession of England.

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NORMANDY, DUKE OF. See ROBERT.

NOR'MAN FRENCH. A French dialect which developed in Normandy, the ancient department of France, after the Scandinavian invaders, under Rollo, had settled there about 911. (See NORMANDY; NORMANS.) At a very early date these Scandinavians adopted the French language as well as French religion and culture. In adopting French as a medium of communication the Normans retained for purposes of literary expression many Scandinavian words, which are still, though in a greatly changed form, characteristic of this French dialect. It is not always possible, however, to distinguish these elements, because Norman French has been influenced, though undoubtedly to a much less extent, by another Germanic tongue, the Saxon. The largest class of Scandinavian derivatives in Norman French is that of proper names of persons and places. Among the first of these, occurring in manuscripts of an early date, may be mentioned *Boudre* from *Baldr*, *Hérault* from *Haraldr*, *Turquetil* from *Thorketill*, and *Sigvard* from *Sigwarth*. In place names suggestions of a Danish origin are numerous, as in *Danneval*, *La Dennerie*, *Danemarche*, *Dancourt*. Many Northern suffixes occur in Norman place names, as *dalle* in *Brecquedalle*, *bec* in *Caudebec*, *Houlbec*, etc.; *torp*, familiar in English words of Scandinavian origin, in *Torp-en-Caux; stein* in *Crestein* and *Gouestain; nès*, from ONorse *ness*, in *Nès-de-Jobourg* and *Nès-de-Tancarville*. Among other words of possible Scandinavian origin the following may be noted: *bruman*, a benedict; *vin huet*, white wine; *raguer*, to shave or rake; *tang*, seaweed, probably from OIcel. *thang*. Several nautical terms in use in Norman French seem to be of Norse origin, as *brant*, the bow of a ship, from ONorse *brandr; escuif*, a ship; *hune*, top of a mast, from OIcel. *hunn*. A few of these words have passed into standard French, but most of them are used only dialectically. Norman French is also distinguished by its sounds, prominent among which is the pronunciation of initial *h*, which in other French dialects is silent. Likewise Latin *c* and *g*, followed by the vowel *a*, which regularly became *ch* and *j* in standard French, retain the hard sound in Norman French; thus, *Caux*, *cambre*, *ceval*, *gal*, etc. Inversely *c*, followed by *e* or *i* in Latin, assumed the *ch* sound in Norman, whereas it remained *c*, with a sibilant sound, in French. The leading characteristic of the modern Norman dialect is the suppression of the final *r* in pronunciation; thus, *la mé* for *la mer*.

During the early period Norman French played an important part in French literature, some of the most important monuments being written in this dialect. Some of these works have been gathered together in the *Bibliotheca Normannica* under the general editorship of Suchier (8 vols., Halle, 1879–1911), but the greater part are scattered through various publications. Before the twelfth century Latin was apparently the literary language of Normandy, but after that date French came into vogue. Among the most important works written in this dialect are historical accounts, for it was in Normandy that history in the vulgar tongue first made its appearance. Geffrei Gaimar's *Estorie des Engles*, which belongs to the middle of the twelfth century, is connected with the achievements of the Anglo-Normans; Wace, who died about 1175, wrote the *Roman de Brut*, drawn from Geoffrey of Monmouth, which purports to give an account of the English from the fall of Troy, and the *Roman de Rou*, a long account of the Norman dukes continued later by Benoît de Sainte-More. Besides the continuation of Sigebert de Gembloux's *Chronique universelle*, written by Robert de Thorigny, abbot of Mont Saint-Michel from 1144 to 1186, and the anonymous history of the dukes of Normandy and kings of England until 1220, we must not omit the great poem on the pilgrimage of Richard Cœur de Lion written by a certain Ambroise before 1196. Alexandre de Bernai, one of the authors of the *Chanson d'Alexandre*, Alexandre de Ville-Dieu, the author of the *Doctrinale*, Guillaume le Clerc, author of the *Bestiaire divin*, all belong to the thirteenth century. Marie de France (q.v.), who wrote about 1175, is one of the great names in Norman literature. The wars of the thirteenth and fourteenth centuries produced many important chronicles, among which may be noted the *Chronique normande* (1337–72), *Chronique du Mont-Saint-Michel* (1343–1458), *Chronique* of Pierre Cochon, the apostolic notary who died at Rouen in 1456, and the *Recouvrement de Normandie*, composed by the héraut Berry. From this time on the literature of Normandy identifies itself with that of France. Nevertheless even at the present time there is a school of poets who write in the Norman dialect. The *Revue Normande*, *Pays Normand*, and *Bouais-Jan* are among their organs.

Of greater interest perhaps to English readers is the history of Norman French in England after the Conquest. In order to distinguish between the French used on the Continent and that used in England, the latter is often called Anglo-Norman or Anglo-French, of which terms the second is also used to indicate the later period of this dialect. Anglo-Norman did not undergo a regular course of growth followed by gradual decay as did its sister dialect on the Continent; on the contrary the great distinguishing characteristic of Anglo-Norman is its irregularity, due principally to the personal equation. Furthermore the alterations in this language were for the most part fortuitous and were therefore not necessarily general among the writers of any one epoch. It is impossible then to divide the history of the language into successive stages. One of the most obvious influences in the case of Anglo-Norman was the introduction of English words, especially those that expressed specifically English ideas for which no designation existed in that language. The pronunciation was also influenced by the English, especially in connection with the stress accent. Even before the Conquest the influence of French had begun as a result of the strong French sympathies of Edward the Confessor, and for several centuries after the Conquest French continued to be the court as well as the legal language. Among the characteristic features of the early Anglo-Norman the following may be noted: the frequent use of *u* to represent the close *o* of Old French, which has since changed into *eu* in Modern French—thus, *flur*, *dolur*, *ure*, ModFr. *fleur*, *douleur*, *heure;* and the disappearance of intervocalic *d*, which took place at an earlier date than in Old French—thus, OFr. *fede*, from Lat. *fidem*, became *fei* in Anglo-Norman. The loss of case endings, begun already at the commencement of the twelfth century, was completed earlier in Anglo-Norman than in any dialect of the Continent. Finally, the intercalation of the vowel *u* in the nasal group *an* (*aunt*, OFr. *ante; gauntelet*, OFr. *gantelet*) is characteristic of this dialect after the close of the twelfth century.

A considerable French literature was produced in England, both in poetry and prose. Among the most important works of the twelfth century may be mentioned the *Cumpoz* and *Bestiaire* of Philippe de Thaün, the laws of William the Conqueror, and versions of the Alexis, Roland, and Brandan legends, besides the *Chançun de Guillelme*, which probably belongs to the end of the eleventh century. The thirteenth century was by far the most flourishing epoch of the Anglo-Norman literature. Among the poets belonging to this period are Adgar; Fantosme, who wrote a *Chronique* of the invasions of the Scots in 1173–74; Angier, author of a life of Gregory the Great; Chardri; and Guillaume de Berneville, who wrote a life of St. Gilles. Thomas Becket, Bevis of Hampton (Bœve de Haumtone), St. Auban, and others are the subjects of anonymous poems, while versions of the *Pèlerinage de Charlemagne*, and the mystery play of Adam, as well as a *Fabliau du Héron*, are also of interest. The fourteenth century, marking the decline of this literature, is noted for the *Contes moralisées* of Nicole Bozon and versions of various biblical legends.

After the decline of the Anglo-Norman literature French continued to be the language of pleadings in the law courts even as late as the period of Henry VIII. When argument was slowly differentiated from out of the mixed process of arguing and pleading, it was done in English, and the precedence of the native tongue became greater and greater until the Revolution, when law French had completely died out. Learned jurists, however, continued to favor the use of the foreign language to such an extent that in 1734 Roger North said that "really the law is scarcely expressible properly in English." English legal language is still replete with words either borrowed directly from the French or made from infinitives into substantives as in Old French. In the first category there are such words as *tort; asset* from Fr. *assez; a tailed fee* from Fr. *tailler*, to cut; the formation of substantives in *-ee*, as *lessee* from Fr. *lessé*, *donee*, *grantee*, *obligee*, though it is the person who is not *obligé*, *mortgagee*, etc. In the second category is the long list of substantives in *-er*, such as *voucher*, *attainder*, *disclaimer*, *ouster*, *tender*, *interpleader*, *remitter*, *demurrer*, *cesser*, *estover*, *merger*, *remainder* from OFr. *remeindre*, to remain or stay out, and many others. The cry *oyes* used at the opening of courts is the Fr. *oyez*, hear ye. It was in Edward II's day that law French was in its prime. In 1903 the Selden Society began the publication of the *Year Books of Edward II* under the editorship of Maitland, Turner, Harcourt, and others, of which eight volumes had appeared in 1914. The introduction to volume i contains an excellent study of the legal French language by Maitland.

Bibliography. A good popular account of Anglo-French is found in W. W. Skeat, *Principles of English Etymology* (Oxford, 1891). For a more technical treatment the reader is referred to the article by Behrens in Hermann Paul, *Grundriss der germanischen Philologie* (2d ed., Strassburg, 1901), and L. E. Menger, *The Anglo-Norman Dialect* (New York, 1904). For the delimitation of the Norman dialects in France the best works to be consulted are Gilliéron and Edmont, *Atlas linguistique de la France* (Paris, 1902–12), and Charles Guerlin de Guer, *Atlas dialectologique de Normandie* (ib., 1903). Good accounts of the modern Norman dialects can be found in id., *Le patois normand* (ib., 1896); id., *Essai de dialectologie normande* (ib., 1899); and the *Bulletin des parlers normands* (ib., 1898 et seq.). The *Bibliotheca Normannica* (8 vols., Halle, 1879–1911), published under the editorship of Suchier, contains many important texts. There is no complete dictionary of Norman or Anglo-Norman, though useful lists of English words found in Anglo-French have been published by W. W. Skeat (Oxford, 1882–89). Useful compilations, though subject to modifications in view of the progress of philological research, are Edouard Le Héricher, *Histoire et glossaire du normand, de l'anglais et de la langue française* (Paris, 1862); Henri Moisy, *Noms de famille normands* (ib., 1875); and Priebsch, "Ein anglonormannisches Glossar," in *Bausteine zur romanischen Philologie* (Halle, 1905). For etymologies, consult Gustav Körting, *Etymologisches Wörterbuch der französischen Sprache* (Paderborn, 1908), and Wilhelm Meyer-Lübke, *Romanisches etymologisches Wörterbuch* (Heidelberg, 1911 et seq.). The question of the influence of Scandinavian culture on the Normans has been discussed from opposite points of view by Edouard Le Héricher, *Les Scandinaves en Normandie* (Paris, 1877), and A. Fabricius, *Danske Minder i Normandiet* (Copenhagen, 1897). Other publications of a more special character as Vising, *Etude sur le dialecte anglo-normand du XIIe siècle* (Upsala, 1882); Hammer, "Die Sprache der anglonormannischen Brandanlegende," in the *Zeitschrift für romanische Philologie* (Halle, 1885); Emil Busch, *Laut- und Formenlehre der anglonormannischen Sprache des XIV. Jahrhunderts* (Greifswald, 1887); Pope, *Etude sur la langue de frère Angier* (Paris, 1903); Ernst Burghardt, *Ueber den Einfluss des Englischen auf das Anglonormannische* (Halle, 1906); Mettig, *Die französischen Elemente im Alt- und Mittelenglischen, 800–1258* (Marburg, 1910); Conrad de Boer (ed.), *Pyrame et Thisbé, texte normand du XIIème siècle* (Amsterdam, 1911); R. G. de Beaucoudrey, *Le langage normand au début du XXème siècle* (Paris, 1912).

NORMAN LAW. When, about 911, Charles the Simple ceded to the Norwegian viking Hrolf, or Rollo, that portion of Neustria which was thenceforth known as the Duchy of Normandy, the institutions and customs of the country were Frankish. These institutions and customs the conquerors apparently accepted, for there is little trace in the later Norman law of Scandinavian influences. Some at least of the Frankish Imperial institutions were more fully preserved under the Norman dukes than in other parts of France. Our knowledge, however, of Norman law in the tenth and eleventh centuries is very imperfect; it is based largely on inferences from earlier Frankish and later Anglo-Norman sources.

For the period from the Norman conquest of England in 1066 to the French conquest of Normandy in 1202–04 we have considerable material; we have twelfth-century documents (printed by Bigelow as an appendix to his *History of Procedure in England*, 1880) and more or less complete Exchequer Rolls of various dates from 1180 to 1203 (published by Stapleton, with valuable observations, 1840, 1844). That the organization of the Exchequer in England was originally Norman and not English is shown by its existence in the Norman Kingdom of Sicily in the first half of the twelfth century. As later in England, Exchequer was a judicial as well as an administrative authority, and from the time of Henry I it included trained lawyers. Like the Frankish emperors, the Norman dukes sent out *missi*, or itinerant justices, who held court in various parts of the duchy. In the ducal court and in the circuit courts procedure was initiated by ducal writ (*breve*), and proof by wager of battle was supplanted by an inquest of the vicinage. This was a further development of the Frankish *inquisitio;* and the Norman "jury of proof," as Brunner calls it, was transferred to England and became the jury of judgment. That in other respects the influence of Norman law upon English law was very great is universally admitted, but there is as yet no agreement as to the extent to which it superseded the older Saxon law.

When Philip Augustus conquered Normandy, he promised that the duchy should preserve its privileges. Shortly before, about 1200, a private compilation had been made, known as the *Statuta et Consuetudines Normanniæ.* To this was added, about 1218, a *Tractatus de Brevibus et Recognitionibus.* Later in the same century appeared compilations of judgments rendered in the Exchequer and of judgments rendered in assize. The most complete statement of Norman law, however, is the *Grand Coutumier de Normandie,* described in the oldest Latin texts as the *Summa de Legibus Normanniæ* or *Jura et Consuetudines Normanniæ.* See Grand Coutumier of Normandy.

Gradually, by judicial interpretation, the law of Normandy was assimilated to that of Paris and of northern France generally. Not only were the courts filled with French judges, but cases were carried to the Parliament in Paris. About the middle of the sixteenth century Guillaume Terrien wrote a commentary on the laws of Normandy, which was printed in 1574. This work and the original *Grand Coutumier* still constitute the basis of the law of the English Channel Islands.

In 1577 Henry III ordered that a new *coutume* be drawn up for Normandy. The royal commissioners stated in their report that the old *coutume* was largely unintelligible and for the most part no longer in use, and in their revision they omitted some of the most important institutions which give the Norman law its historical importance, including the incompletely developed jury. The new *coutume* remained in force until the Code Napoléon gave France a common law.

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NORMANN, nôr′mȧn, Eilert Adelsten (1848–). A Norwegian landscape painter, born at Bodö. He studied (1869–73) under Eugen Dücker at the Academy in Düsseldorf, whence he afterward made annual trips in his native country. The Norwegian fiords and their majestic surroundings furnished the themes for most of his works, executed with truly poetic conception and luminous in color. In 1887 he removed to Berlin, where his style gradually changed to a more realistic treatment. His best-known views include: "The Harbor of Bodö" (Düsseldorf Gallery); "Midnight in Lofoten Islands" (Cologne Museum); "Romsdals Fiord" (Stockholm Museum); "Summer Night in Lofoten Islands" (National Gallery, Berlin); "Narö-Fiord" (Dresden Gallery and Museo Civico, Turin); "Sogne Fiord" (Rudolphinum, Prague, and National Museum, Budapest).

NORMANN-NERUDA, Wilma Maria Francisca. See Neruda, W. M. F.

NOR′MANS (OF. *Norman, Normand,* from Dan. *Normand,* Icel. *Norþmaþr,* Northman, from Icel., AS. *norþ,* OHG. *nord,* Ger. *Nord,* north. probably connected with Umb. *nertro,* to the left, Gk. *νέρτερος, nerteros,* lower + *maþr,* Goth. *manna,* AS. OHG. *man,* Ger. *Mann,* man). A name generally restricted in its application to those sea rovers who established themselves in the part of France called, after them, Normandy, but sometimes embracing also the early inhabitants of Norway. During the Middle Ages the name Northmen, or Norsemen, was often used in a broader sense, to denote the entire population of Scandinavia. The Germans and French called the piratical hordes who ravaged their shores Normans or Northmen; the Saxons, usually Danes or Eastmen. They were also distinguished by the latter as *Mark*(or March)men (from Den*mark*), as *Ash*men (i.e., men of the *ashen* ships), and as the *Heathen.* The primary cause of the plundering expeditions southward and westward across the seas, undertaken by the Norse vikings, sea kings, was doubtless the over-population and consequent scarcity of food in their native homes; besides, the relish for a life of warlike adventure, conjoined with the hope of rich booty, strongly attracted them. Finally discontent with the ever-increasing power of the greater chiefs or kings induced many of the nobles with their followers to seek new homes.

The first Danish Norsemen made their appearance on the eastern and southern coasts of England about 787. In 795 they settled in some of the towns on the coast of Ireland. After 832 their invasions of England were repeated almost every year. In 851 they wintered for the first time in the island and after 866 obtained firm footing there. The Anglo-Saxon Ethelred I fought valiantly against them. His brother, Alfred the Great (q.v.), after a long and doubtful struggle, partially reduced them to subjection; nevertheless he was compelled to leave them in possession of Northumbria and East Anglia and had not only to defend himself against a new and fierce invasion led by the famous rover Hastings (q.v.), but to contend against the revolts of his Dano-Norman subjects, which continued to trouble his immediate successors. A period of external peace ensued, but in 991 the invasions of the Danes and Norwegians began anew. The Saxon King, Ethelred II, at first sought to buy them off by paying a sort of tribute money, called Danegeld (q.v.); but the massacre of the Danes living in England, by command of that monarch, Nov. 13, 1002, was avenged by four expeditions under the Danish King, Sweyn, who frightfully wasted the country and finally conquered it in 1013, dying the following year. His son, Knut, or Canute (q.v.), after carrying on a struggle for the supreme power with Ethelred and his successor Edmund Ironside (q.v.), at length, on the death of the latter, became sole monarch of England, which now remained under Danish or Norse rulers till 1042. The government of the country then reverted into the Saxon hands of Edward the Confessor (q.v.), who was succeeded in 1066 by Harold II (q.v.), son of the powerful Godwin (q.v.), Earl of Wessex; but in October of the same year Harold lost his life and crown at the battle of Hastings, and William the Conqueror, a descendant of a Norwegian chief who had settled in Normandy, once more established a Norse dynasty on the throne of England.

It was also Danish Norsemen, in particular, who ravaged the western coasts of the European mainland, from the Elbe to the Garonne. As early as 810 the Danish King, Gottfried, had overrun Friesland; but the power of Charles the Great was too much for these undisciplined barbarians, and they were overawed and subdued for a time. Soon after his death, however, they recommenced (c.820) their piratical expeditions and, favored by the weakness and dissensions of the Carolingian rulers, became during the ninth century the terror and scourge of northwestern Germany and France. They plundered Hamburg several times, ravaged the coasts of the Frisians (whose country then extended as far as the Scheldt), and in 843 firmly planted themselves at the mouth of the Loire. Erelong they swarmed up the great rivers into the interior of the country, which they devastated far and wide. In 842 they were at Rouen. In 845 they ascended the Seine and plundered Paris—an exploit which was frequently repeated. In 885 not less than 40,000 of these vikings, in 700 vessels, are said to have ascended the river from Rouen, under the leadership of one Siegfried, and besieged the capital for 10 months. It was only saved at the expense of Burgundy, which was abandoned to their ravages. In 881 Louis III, King of the West Franks, inflicted a severe defeat on the invaders at Vineu, near Abbeville, in Picardy; but neither that nor the repulse which they sustained from the brave German monarch Arnulf near Louvain in 891 could hinder them from making fresh irruptions. In 892 they appeared before Bonn, and tradition says that bands of Danish rovers penetrated even into Switzerland and established themselves in the Canton of Schwyz and the Vale of Hasli. From their settlements in Aquitania they proceeded at an early period to Spain, plundered the coasts of Galicia in 844, and subsequently landed in Andalusia, but were defeated near Seville by the Arab prince Abd-ur-Rahman. In 859–860 they forced their way into the Mediterranean, plundered the shores of Spain, Africa, and the Balearic Isles, and penetrated up the Rhone as far as Valence; then, turning their piratical prows in the direction of Italy, entered the Tyrrhenian Sea, burned Pisa and Lucca, and actually touched distant Greece before their passion for destruction was satiated.

Doubtless Norwegian rovers also took part in these so-called Danish expeditions. We know that as early as the beginning of the ninth century they made voyages to the north of Ireland, Scotland, the Hebrides, the Orkney and Shetland Isles; and the increasing power of Harald Haarfagr (q.v.), in the ninth and tenth centuries, exciting great discontent among the smaller chiefs, great emigrations took place, and these islands became the new homes of these Norwegian vikings. About the same period colonies were settled in the Faroe Isles and Iceland, from which some vikings proceeded westward across the North Atlantic to Greenland about 983, and thence about 20 years later southward to a region which they called Vinland, believed by some to be the coast of Canada or of New England, thus probably anticipating the discovery of America by Columbus by nearly 500 years. From Norway also issued the last and most important expedition against the coast of France. It was led by Hrolf, or Rollo (q.v.). Hrolf forced Charles the Simple to grant him possession of all the land in the valley of the Seine, from the Epte and Eure to the sea (911 or 912). The invaders firmly planted themselves in the country, which henceforth went by the name of Normandy (q.v.). They and their descendants are, strictly speaking, the Normans of history. They rapidly adopted the more civilized form of life that prevailed in the Frankish kingdom—its religion, language, and manners. At a later period, the twelfth century, they even developed a great school of narrative poetry, whose cultivators, the trouveurs, or trouvères, rivaled in celebrity the lyrical troubadours of southern France. But though the Normans had acquired comparatively settled habits in France, the old passion for adventure was still strong in their blood; and in the course of the eleventh century many nobles with their followers betook themselves to southern Italy, where the strifes of the native princes, Greek and Arab, opened up a fine prospect for ambitious designs. In 1059 Robert Guiscard (q.v.), one of the 10 sons of the Norman Count Tancred de Hauteville, all of whom had gone thither, was recognized by Pope Nicholas II as Duke of Apulia and Calabria. His brother and liegeman, Roger, conquered Sicily. Roger II of Sicily united the two dominions in 1127 and in 1130 assumed the title of King of Sicily; but in the person of his grandson, William II, the Norman dynasty became extinct, and the Kingdom passed into the hands of the Hohenstaufen family. These Normans of Italy played also a considerable rôle in the Crusades, especially in the first, of which Bohemund I (q.v.) and Tancred (q.v.) were among the principal leaders. See CRUSADE.

The Swedish Norsemen directed their expeditions chiefly against the eastern coasts of the Baltic—Courland, Esthonia, and Finland—where they made their appearance in the ninth century, at the very time when their Danish and Norwegian brethren were roving over the North Sea, the English Channel, and the Bay of Biscay and were establishing themselves on the shores of England and France. According to the narrative of the Russian annalist Nestor, they appear to have penetrated into the interior as far as Novgorod, whence they were quickly banished by the native Slavic and Finnish inhabitants, but were as quickly solicited to return and assume the reins of government. Rurik (q.v.) founded one Kingdom at Novgorod (862), which stretched northward as far as the White Sea. His successor, Oleg, united with that a second, established by other Swedish adventurers at Kiev. (See RUSSIA.) For a long period these Norsemen, who, it appears, became completely identified with their Slavic-speaking subjects in the tenth century, were dangerous enemies of the Byzantine Empire, whose coasts they reached by way of the Black Sea and whose capital, Constantinople, they frequently menaced, as, e.g., when Igor is said to have appeared before the city with upward of 1000 ships or boats, about the middle of the tenth century. Earlier in the same century these warriors had found their way into the Caspian Sea and actually penetrated as far as Persia. Partly from them and partly from native Scandinavians came those soldiers who from the ninth to the twelfth century formed the bodyguard of the Byzantine emperors, the celebrated Varangians (q.v.).

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NORMANTON, nôr′man-ton. A town in the West Riding of Yorkshire, England, near the Calder, 8 miles south-southeast of Leeds. It is an important railway junction and has coal-mining industries, ironworks, and a large agricultural trade. Pop., 1901, 12,352; 1911, 15,032.

NORNS (Icel. *Nornir*, Fates). The Fates of the Scandinavian mythology. They were three young women, by name Urd, Verdandi, and Skuld—i.e., past, present, and future. They sit by the well Urdarbrunnr under the world tree Yggdrasill, and there determine the fate of gods and men. Every day they draw water from the spring and with it and the clay that lies around the wells sprinkle the ash tree Yggdrasill, that its branches may not rot and wither away. Besides these three great norns there are also many inferior ones, both good and bad; for, says the *Prose Edda*, when a man is born there is a norn to determine his fate; and the same authority tells us that the unequal destinies of men in the world are attributable to the different dispositions of the norns. These lesser norns corresponded to the genii of classic mythology. Women who possessed the power of prediction or magic also bore this name.

NORQUAY, nôr′kā′, John (1841–89). A Canadian statesman, of Scottish and Indian descent, born at St. Andrews, Red River Settlement (now Manitoba). He received a good education at St. John's Academy and, early becoming interested in politics, exerted a conciliating influence in the exciting disputes preceding the first rebellion under Louis Riel (q.v.) in 1869. After the suppression of the rebellion in 1870 he was elected to the first Manitoba Legislature and in 1871 became Minister of Public Works and Agriculture. Resigning in 1874, he again became Minister of Public Works in 1876. He was Premier in 1878–87, during that period holding also the offices of Provincial Treasurer (1878–86) and Railway Commissioner (1886–87). Norquay vigorously upheld the rights of his native province and initiated the struggle for the enlarged boundaries, finally granted in 1912. (See Manitoba.) He also contended successfully against the monopoly in railway construction conferred upon the Canadian Pacific Railway and procured useful legislation establishing municipalities and county courts. Consult Alexander Begg, *History of the North-West* (Toronto, 1894).

NOR′RIDGEWOCK (properly *Nañrantswak*, where the river falls again). A tribe of Algonquian stock (q.v.), the leading member of the Abnaki (q.v.) Confederacy. Their principal village, which bore the tribal name, was on the left bank of the Kennebec River, just below the rapids at Indian Old Point, near the present Norridgewock, Me. Their territory embraced the whole Kennebec River region nearly to the coast, whence they were frequently called Kennebec Indians. The French established a mission at Norridgewock in 1688, and in 1695 the Jesuit Rasle took up his residence there, where he remained for the rest of his life and succeeded in attaching the tribe so warmly to the French cause that they came to be regarded as the most dangerous enemies of the English colonists. In 1724 an expedition was sent against the settlement, which resulted in the destruction of the village and the dispersion of the tribe, Rasle himself being shot. A part of the fugitive Norridgewock afterward returned and rebuilt their village, but on a second attack by the English in 1749 they retired to Canada, most of them joining the other New England refugees at St. Francis.

NOR′RIS, Frank (in full, Benjamin Franklin) (1870–1902). An American novelist, born March 5, 1870, in Chicago. He studied art in Paris from 1887 to 1889 and pursued literary courses at the University of California (1890–94) and at Harvard (1894–95). *Yberville*, a story of Spanish life in old California, appeared in 1891. Norris was war correspondent in South Africa for the San Francisco *Chronicle* at the time of the Jameson Raid, in 1896 and 1897 was an editor of the San Francisco *Wave*, and in 1898 was war correspondent in Cuba for *McClure's Magazine*. *McTeague* (1899), a realistic picture of the slums of San Francisco, was his first novel to attract attention. *Moran of the Lady Letty* (1898) is a story of adventure off the California coast. *The Octopus*, the first novel of a trilogy embodying an "epic of the wheat," was published in 1901. It concerns the growing of the wheat and arraigns the oppressive methods of railroad monopoly as existing in California. *The Pit* (1903), dealing with the battles over the exchange of the wheat, constitutes a dramatic indictment of the evils of grain speculation. The last part, *The Wolf*, as planned but left unfinished, was to depict the struggle for the wheat in a famine-stricken community in Europe. Just previous to his death (Oct. 25, 1902) Norris had been serving as literary adviser in a publishing house in New York City. Other writings than those mentioned include: *Blix* (1899); *A Man's Woman* (1900); a volume of short stories, *The Third Circle* (1909). Norris was one of the noteworthy writers of his day in America, and his novels, if not remarkable by their artistry or creative power, are still vivid transcripts of certain phases of American life. They might have been forerunners of a notable series if the author had lived to years of richer experience and riper ability. Consult F. T. Cooper, *Some American Story Tellers* (New York, 1911), and J. C. Underwood, *Literature and Insurgency* (ib., 1914).

NORRIS, George William (1861–). An American lawyer and legislator, born in Sandusky Co., Ohio. He was educated at Baldwin University (Ohio), and at the Northern Indiana Normal College, graduating in 1881. He studied law while teaching and after admission to the Ohio bar (1883) removed to Nebraska. As a Republican, he was elected and reëlected prosecuting attorney of Furnas County for three terms, from 1895 to 1902 was judge of the fourteenth district, and served in Congress from 1903 until 1913. Norris aligned himself with the insurgent and progressive element of the Republican party, opposing particularly the dominance of the Speaker in the Committee on Rules. It was supposedly for his activity in this regard that he was removed from the Committee on Public Buildings. Norris was the leader of the 35 insurgents in the memorable parliamentary struggle of March, 1910, to reorganize the rules committee and overthrow Speaker Cannon. He introduced the resolution providing for the election of a committee by the House and for the elimination from it of the Speaker. Although this resolution was adopted through a coalition with the Democrats, Norris refused to vote for the deposition of Cannon. In 1912 he declined to leave the Republican party to join the Progressives. In the same year he was elected to the Senate.

NORRIS, Sir John (c.1547–97). An English soldier. He served as a volunteer under Admiral Coligny in the civil wars of France, fought the Irish in Ulster in 1573–75, and aided the Dutch against the Spanish in 1577–84, thereby winning distinction as an able commander. In 1584 he was again sent to Ireland, this time as Lord President of Munster, but in 1585 he was again in the Netherlands, commanding the English forces who were opposing the Spanish. He was recalled in 1586, but again served in the Low Countries in 1587–88. Norris was Ambassador to the Dutch states in 1589, and in the same year he and Sir Francis Drake commanded the fleet that attacked the coasts of Portugal and Spain. He assisted Henry IV of France in 1591 and 1593 in his struggle against the League in Brittany. Norris returned to his lord-presidency of Munster in 1595 and renewed his attempts to subjugate the Irish in Ulster. He was knighted in 1586.

NORRIS, John (1657–1711). An English divine and writer on philosophy, born at Collingbourne-Kingston, Wiltshire. He studied at Winchester and graduated B.A. at Exeter College, Oxford, in 1680. He obtained a fellowship at All Souls, took orders in 1689, and held livings at Newton St. Loe (1689–92) and at Bemerton (1692–1711). His writings are largely an exposition of the philosophical system of Malebranche, whose chief English disciple Norris was, and these works include: *The Theory and Regulation of Love* (1688; 2d ed., 1694); *Practical Discourses* (3 vols., 1691–93); *An Account of Reason and Faith* (1697; 14th ed., 1790); *An Essay towards the Theory of the Ideal or Intelligible World* (2 vols., 1701–04; 3d ed., 1722); *A Treatise Concerning Christian Prudence* (1710).

NORRIS, Kathleen (Thompson) (1880–). An American story-writer. She was born in San Francisco and took a special course at the University of California. In 1909 she was married to Charles Gilman Norris. Besides short stories contributed after 1910 to the *Atlantic, American Magazine, McClure's, Everybody's, Ladies' Home Journal,* and *Woman's Home Companion,* she is author of: *Mother* (1911; new ed., 1913); *The Rich Mrs. Burgoyne* (1912); *Poor Dear Margaret Kirby* (1913); *The Treasure* (1914); *Saturday's Child* (1914).

NORRIS, Tobias Crawford (1861–). A Canadian statesman. He was born at Brampton, Ontario, but in early manhood removing to Manitoba, was a farmer for several years, and later an auctioneer of live stock. After some years' experience in municipal politics he was elected a Liberal member for Lansdowne in the Manitoba Legislature, retaining his seat for seven years. He was again returned for that constituency in 1907 and was elected leader of the Liberal Opposition in 1909. Upon the resignation of the cabinet of Sir R. P. Roblin (q.v.) in May, 1915, Norris became Premier of Manitoba.

NORRIS, William Edward (1847–). An English novelist, born in London. After leaving Eton he went to the Continent to study languages, with the intention of entering the diplomatic service. Instead he studied law and was admitted to the bar in 1874, but never practiced. His short stories, contributed to the *Cornhill Magazine,* attracted the especial notice of the editor, Leslie Stephen, by whom he was encouraged to attempt the longer novel. His *Heaps of Money* (1877) was followed by *Mademoiselle de Mersac,* a serial in *Cornhill* for 1879, and *Matrimony* (1880), a novel showing fine discrimination in character drawing. Among his other novels are: *A Bachelor's Blunder* (1885); *Major and Minor* (1887); *Miss Shafto* (1889); *Marcia* (1890); *His Grace* (1892); *The Dancer in Yellow* (1896); *The Widower* (1898); *An Octave* (1900); *Lord Leonard the Luckless* (1903); *Nature's Comedian* (1904); *Barham of Beltana* (1905); *Pauline* (1908); *The Perjurer* (1909); *Not Guilty* (1910); *The Rt. Hon. Gentleman* (1913); *Barbara and Company* (1914).

NOR'RISTOWN. A borough and the county seat of Montgomery Co., Pa., 17 miles west by north of Philadelphia, on the Schuylkill River, the Schuylkill Canal, and the Pennsylvania, the Stony Creek, and the Philadelphia and Reading railroads (Map: Pennsylvania, L 7). Among the institutions here are the county prison, the Norristown Hospital for the Insane (State), Charity Hospital, the Agnes Stinson Home for Aged Ladies, Friends' Home, St. Joseph's Protectory (Roman Catholic) for girls, McCann Library (public), and Montgomery County Historical Society. Other prominent buildings and places of interest are the county courthouse, municipal building, high school, Masonic Temple, Island Park, Montgomery Cemetery, with a tomb of Gen. W. S. Hancock and a shaft to Gen. John F. Hartranft, the Schuylkill Bridge (1829), and Valley Forge, 6 miles distant. Norristown is in a rich agricultural region and has extensive manufactures of cigars, tacks, wire, screws, boilers, bolts, silos, tanks, iron, hosiery, knitting machines, underwear, shirts, lumber and milling machinery, paper boxes, rugs, carpets, etc. In the vicinity are quarries of marble, granite, and limestone. The government is administered by a burgess, elected every three years, and a unicameral council, which controls elections of subordinate municipal departments. Norristown owns and operates its electric-light plant. Founded in 1784 and named in honor of Isaac Norris, who had formerly owned a large part of the land in this vicinity, Norristown was incorporated as a borough in 1812, its population then being about 500. It was enlarged in 1853. Pop., 1900, 22,265; 1910, 27,875; 1914 (U. S. est.), 30,265. Consult Theodore Heysham, *Norristown, 1812–1912* (Norristown, 1913).

NORRKÖPING, nôr'chē-pĭng. A seaport on the east coast of Sweden, situated at the head of the Bråvik, 75 miles southwest of Stockholm (Map: Sweden, F 7). It is regularly laid out with streets crossing at right angles and has several beautiful parks, squares, and promenades. There are many fine modern buildings, among the best of which are the almost palatial public schools, the new church of St. Matthew, the city hall, and the labor lyceum. The Motala, which flows through the town, is extensively utilized for water power, and Norrköping is one of the foremost manufacturing towns of Sweden. In 1911 there were 175 factories, whose products for the year were valued at $12,427,000. The most important manufactures are woolen and cotton textiles, paper, tapestries, and sugar. Norrköping is also one of the most important commercial ports in the country. Its harbor admits the largest vessels. The shipping entered in 1912 amounted to 477,038 tons. The chief exports are manufactured goods, grain, wood, and dairy products. Pop., 1900, 41,008; 1910, 45,416.

NORRLAND, nôr′lȧnd. The northernmost and largest, but least populous, of the three historical divisions of Sweden, the other two being Svealand and Götaland. It extends south as far as Gefle and has an area of 80,785 square miles. Pop., 1901, 860,254; 1910, 963,397.

NORSEMEN, or **NORTHMEN**. See NORMANS.

NORSE MYTHOLOGY. See ÆSIR; SCANDINAVIAN MYTHOLOGY.

NORTE DE SANTANDER, nôr′tȧ dȧ sän′tän-där′. A department of Colombia (Map: Colombia, C 2). It has an area of 7720 square miles. Because of the mountainous character of part of the department, its climate varies from tropical to frigid. Agriculture is the chief industry; the products include coffee, cacao, wheat, and potatoes. The mineral wealth consists of gold, silver, iron, copper, and coal. Numerous highways are in the course of construction. Pop., 1896, 164,290; 1912, 204,381. Capital, San José de Cúcuta (q.v.).

NORTH, CHRISTOPHER. The pseudonym of the part author of the *Noctes Ambrosianæ*, John Wilson (q.v.).

NORTH, SIR DUDLEY (1641–91). An English economist, brother of Francis North, Baron Guilford. He was born at Westminster, was engaged in foreign trade at Smyrna and Constantinople, and in 1682 became sheriff of London and was knighted. Appointed a commissioner of customs in the following year, he was soon transferred to the Treasury, but on the accession of James II he received his customs post and continued to hold it until after the accession of William of Orange. North's reputation as an economist rests mainly on his tract, *Discourses upon Trade, Principally Directed to the Cases of the Interest, Coinage, Clipping, and Increase of Money* (1691; reprinted, 1907), in which he upholds the doctrine of free trade.

NORTH, ELISHA (1771–1843). An American physician. Born at New London, Conn., his father and grandfather both having been physicians, he studied medicine in Hartford under Lemuel Hopkins and in Philadelphia under Benjamin Rush. He settled in Goshen, Conn., but removed to New London in 1812, where he practiced until his death. A pioneer in vaccination against smallpox, North sent a person, vaccinated for the purpose, to Dr. Edward Miller, of New York City (1800), so that Miller could use vaccine from the pustule for vaccinating others. He was also the first to publish a book on cerebrospinal meningitis—*A Treatise on a Malignant Epidemic, Commonly Called Spotted Fever* (1811). He had paid special attention to the epidemic which raged in New England between 1806 and 1810. Furthermore he was the first in New London and in the United States to establish an eye infirmary. Among his writings are *Outlines of the Science of Life* (1829).

NORTH, FRANCIS, BARON GUILFORD (1637–85). An English jurist. He was born Nov. 2, 1637, the third son of the fourth Lord North. Prejudiced against Presbyterians by the sternness of his early teachers, North was confirmed in this feeling by Dr. Stevens, a sturdy Royalist, head of the school at Bury St. Edmunds, where he finished his preparation for college. Matriculated at St. John's College, Cambridge, he withdrew in two years to become a student of law in the Middle Temple. He was admitted to its practice in 1661, and as he had always been a student of great application, he soon gained a high rank at the bar. Indeed his rise in favor at the court was so rapid that he was accused of using unworthy means to gain his end. He became Solicitor-General in 1671, Attorney-General in 1673, and Lord Chief Justice of the Common Pleas in 1675. In 1682 he was made Lord Keeper of the Great Seal. With other members of the court party he was hostile to Titus Oates (q.v.). North's prejudice against Stephen College, accused of treason and involved in the Popish Plot, was largely responsible for the hanging of College. This is a blot on his fame; but in most cases his decisions were marked by their ability and justice. He was a Royalist, true to Charles II at all times. In 1683 he entered the House of Lords as Baron Guilford, but took little part in its proceedings. Consult Roger North (brother), *The Lives of the Norths* (London, 1826; new ed., 3 vols., 1890).

NORTH, FRANK MASON (1850–). An American Methodist Episcopal clergyman, born in New York City. Graduating from Wesleyan University in 1872, he entered the ministry the next year. He was corresponding secretary of the New York City Church Extension and Missionary Society from 1892 to 1912, when the General Conference elected him one of the three corresponding secretaries of the church's Board of Foreign Missions. He was corresponding secretary of the (Methodist) National City Evangelization Union (1896–1912), editor of the *Christian City* (1892–1912), and became chairman of the executive committee of the Federal Council of Churches in America. In 1914 he made a tour of the mission stations of the Orient.

NORTH, FREDERICK, LORD, second EARL OF GUILFORD (1732–92). An English statesman. He was a son of Francis, seventh Baron North, third Baron Guilford, and first Earl of Guilford. He was born April 13, 1732. After a course at Eton and Trinity College, Oxford, and a period of continental travel, North was at the age of 22 sent to the House of Commons as member from Banbury, a borough of which his father was high steward. From 1759 until the fall of the Rockingham ministry in 1765 he held the position of a Junior Lord of the Treasury. In December, 1766, after a short tenure of the office of paymaster, he was admitted as a member of the Privy Council. His ability won for him, in March, 1767, an offer of the chancellorship of the Exchequer. His attitude on the Townshend tea tax, however, was one of the immediate causes of the American war. It was North's own boast that as a member of the

Commons he had "voted against all popular and in favor of all unpopular measures." In 1770 he succeeded the Duke of Grafton as Prime Minister. He was called by Horace Walpole the ostensible minister, for the real minister was King George III. It has since been proved that North as early as 1776 believed that the unyielding policy he was pursuing with regard to the American Colonies would end in ruin to the King and a great loss to the country; yet in the face of the powerful opposition of Fox and Burke he allowed his own convictions to be overborne by the obstinacy of King George's ultra-Tory purpose. In 1778 he was forced to a renunciation of the right to tax the Colonies; but the concession came too late, and in 1782, finding it impossible to carry on the war any longer, he resigned. With North's retirement came to an end George III's scheme of governing the country by his own will and of ruling the House of Commons. Soon, however, Fox entered into a coalition with North, against whom he had for so many years inveighed. North and Fox took office under the Duke of Portland in 1783, but the coalition lasted only a few months. He succeeded his father as Earl of Guilford in 1790. During the last five years of his life North was totally blind. He bore his afflictions with great cheerfulness. He died Aug. 5, 1792. Consult: W. B. Donne, *Correspondence of George III with Lord North* (London, 1867); G. O. Trevelyan, *The American Revolution* (New York, 1905); Reginald Lucas, *Lord North* (London, 1913).

NORTH, Marianne (1830–90). An English naturalist and flower painter. She studied flower painting under Valentine Bartholomew and traveled extensively in Europe, North and South America, Africa, India, Japan, and Australia, everywhere painting in water color the native flora, with great artistic taste and scientific accuracy. Her work was exhibited in London in 1879, and in 1882 a gallery, erected at her expense, was opened for its reception at the Botanical Gardens at Kew. This was later enlarged and contains a collection of considerable scientific value. Five botanical species have been named after her.

NORTH, Simon Newton Dexter (1849–). An American journalist and statistician, born at Clinton, N. Y. After graduating from Hamilton College in 1869 he was managing editor of the Utica *Morning Herald* until 1886 and editor and joint proprietor of the Albany *Express* (1886–88). In 1885–86 he was president of the New York State Associated Press. For 15 years (1888–1903) North served as secretary of the National Association of Wool Manufacturers and as editor of its *Quarterly Bulletin.* During this period he was also a member of the United States Industrial Commission (1898–99) and on the twelfth census was chief statistician for manufactures. From 1903 to 1909 he was director of the census; in 1906 held the chairmanship of the American Tariff Commission to Germany, and in 1910 was elected president of the American Statistical Association. His writings include: *History and Present Condition of the Newspaper and Periodical Press of the United States* (1884); *A Century of American Wool Manufacture, 1790–1890* (1895); *"Old Greek," An Old-Time Professor in an Old-Fashioned College,* a memoir of his father, Dr. Edward North (1905); *Simeon North—First Official Pistol Maker of the United States* (1913).

NORTH, Sir Thomas (?1535–?1602). An Elizabethan translator, the son of Edward, first Baron North, and younger brother of Roger North (1530–1600), the courtier and soldier. He was probably educated at Peterhouse, Cambridge, and certainly studied at Lincoln's Inn (1557). In 1588 he was captain of 300 men at Ely, was styled a man of courage, and was knighted in 1591. In 1601 he received a pension of £40 for his "good and faithful service." North, a master of clear and robust English, performed still greater service to literature. Under the title *The Diall of Princes* (1557) he Englished the Spaniard Guevara's *Libro aureo,* a work compiled chiefly from the *Meditations* of Marcus Aurelius. North's version was exceedingly popular. From the Italian of Antonio Francesco Doni he published the *Morall Philosophie of Doni* (1570; reprint by J. Jacobs, London, 1891), a collection of Eastern fables. Better known now is his version of Plutarch's *Lives* (1579; 2d ed., 1595; enlarged, 1603), made from the French of Amyot. It was the source of Shakespeare's Roman tragedies. Consult the reprint of the first edition of North's Plutarch, edited by Wyndham (Tudor Library, London, 1895).

NORTH, William (1755–1836). An American soldier, born at Fort Frederick, Me. He entered the Revolutionary army in 1775, took part in the expedition under Benedict Arnold against Canada, and in 1778 was a captain at the battle of Monmouth. The next year he was transferred to the staff of Baron Steuben, to whom he proved a valuable assistant in training the Continental army, and remained with him until the surrender of Cornwallis. He left the army with the brevet rank of brigadier general and went to live with Steuben, whose favorite he had become. A zealous Federalist, he took an active interest in politics and was a member of the United States Senate in 1798–99. During the trouble with France in 1798 he was appointed adjutant general of the army with the rank of brigadier general. He was afterward elected a member of the New York Assembly, of which he became Speaker. He wrote a valuable memoir of Baron Steuben.

NORTH AD′AMS. A city, including several villages within its corporate limits, in Berkshire Co., Mass., 21 miles north by east of Pittsfield, on the Hoosac River and on the Boston and Albany and the Boston and Maine railroads (Map: Massachusetts, A 2). An attractive feature of the city is its beautiful location, amid mountain scenery, at the foot of Greylock, the highest mountain in the State. It is near the west end of the famous Hoosac Tunnel. The more prominent institutions are a State normal school, North Adams Library, and North Adams Hospital. The principal industries include the manufacture of cotton, woolen, and print goods, boots and shoes, machinery, etc. The government is administered, under the charter of 1895, by a mayor, annually elected, and a unicameral council, elected on a general ticket. The majority of subordinate municipal officials are appointed, either absolutely or with the consent of the council, by the executive, but with these exceptions: city clerk and auditor of accounts elected by the council, and assessors, trustees of public library, and school committee chosen by popular vote. North Adams owns its water-supply system. Pop., 1900, 24,200; 1910, 22,019. Settled about 1765, North Adams was separated from Adams and incorporated as a town in 1878. In 1895 it became a city. The site of Fort Massachusetts, which was captured by the French and Indians under Vaudreuil in 1746, is in the western part of the city. Consult Rowe and Fairfield, *North Adams and Vicinity Illustrated* (North Adams, 1898).

NORTHALLERTON, nôrth-ăl′ẽr-ton. A market town in the North Riding of Yorkshire, England, 30 miles northwest of York (Map: England, E 2). It manufactures linen and leather and has brickmaking, malting, and motor-engineering works. Three miles to the south is the place where the Battle of the Standard, so called from a high standard erected on a car by the English, was fought Aug. 22, 1138, between the English under the earls of Albemarle and Ferrers and the Scotch under King David. The latter were defeated. Pop., 1901, 4009; 1911, 4806. For the history, consult Ingledew (London, 1858) and Saywell (Northallerton, 1886).

NORTH AMERICA. See AMERICA.

NORTHAMP′TON. The capital of Northamptonshire, England, a market town, parliamentary county and municipal borough, on the Nene, 58 miles northwest of London (Map: England, F 4). The principal edifices are the shire hall, the handsome town hall, the corn exchange, the numerous churches, several of which are unusually interesting, as St. Peter's, a restored specimen of enriched Norman, and Holy Sepulchre, one of the four round churches in the Kingdom and dating from the twelfth century. It is the seat of a Roman Catholic bishop. Northampton is the centre of the English shoemaking industry and has currying works, iron foundries, malting, breweries, flour and paper mills, and brick and tile works. Large electrical engineering works have been added. There are monthly horse and cattle fairs. It is a horse-racing centre, and two meetings annually are held on a course in the suburbs. Of early English origin, in the *Saxon Chronicle* it is called Mamptune. It was long in the possession of the Danes, who burned it in 1010. It was walled and strongly fortified by Simon de Saint-Liz in 1075. During the Civil War it was held for Parliament. The meadows below the town witnessed the defeat of Henry VI by the Yorkists in 1460. Pop., 1901, 87,021; 1911, 90,064. Consult: *Liber Custumarum: The Ancient Customes of the Town of Northampton* (Northampton, 1895); W. R. D. Adkins, *Northampton in English History* (London, 1898); S. S. Campion, *Northampton with its Surroundings* (Northampton, 1907).

NORTHAMPTON. A city, including several villages, and the county seat of Hampshire Co., Mass., 18 miles north of Springfield, on the Connecticut River and on the Boston and Maine and the New York, New Haven, and Hartford railroads (Map: Massachusetts, B 3). The city, which occupies elevated ground and is noted for its beautiful scenery, has become widely popular as a summer resort. It has, among noteworthy institutions, Smith College (q.v.), an Agricultural School established in 1906, the Clarke Institute for Deaf Mutes, richly endowed by John Clarke, a State hospital for the insane, Smith Charities, Cooley Dickinson Hospital, Home for Aged and Invalid Women, the Burnham Classical School, the Home Culture Club for working men and women, the Forbes and the Clarke libraries, Carnegie Hall, the Academy of Music, and a fine Y. M. C. A. building. Among the conspicuous edifices are the courthouse and high-school building and the only municipally owned theatre in the United States. In the immediate vicinity of Northampton are Mount Tom and Mount Holyoke, both ascended by mountain railways and commanding magnificent views. The principal industries are the manufactures of sewing silk, silk braids, dress silks, silk hosiery, cutlery, brushes, lumber products, caskets, shovels, furniture, wood pulp, hydrants and filters, carburetors, emery wheels, boxes, foundry products, baskets, etc. Tobacco, onions, potatoes, corn, and fruit are raised extensively in this region. The water works are owned and operated by the municipality. Pop., 1900, 18,643; 1910, 19,431; 1914 (U. S. est.), 19,766. Northampton was first settled in 1654 by a small company from Springfield and was named (in 1655) after Northampton, England. In 1676, during King Philip's War, it was attacked by Indians. Jonathan Edwards was minister here from 1729 until dismissed in 1750. Northampton was chartered as a city in 1883. Consult J. R. Trumbull, *History of Northampton, Mass., from its Settlement in 1654* (2 vols., Northampton, 1898–1902).

NORTHAMPTON, ASSIZE OF. A royal decree issued in January, 1176, by Henry II of England. Like the Assize of Clarendon (q.v.), it is in the form of instructions to the itinerant justices for the enforcement of criminal justice. The penalties are severer than they were in the earlier document, and there are special orders in regard to difficulties due to the rebellion of 1173 against Henry II (q.v.), which had centred about Henry's eldest son and namesake. Consult: Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897), and id., *Select Charters* (8th ed., ib., 1895), for the Latin text; Adams and Stephens, *Select Documents of English Constitutional History* (New York, 1901), for an English translation of the document.

NORTHAMP′TONSHIRE, or NORTH′ANTS. A southern midland county of England (Map: England, F 4). Area, 914.3 square miles. The surface generally is undulating and well wooded; the northeast belongs to the Bedford Level. The chief rivers are the Nene, Welland, and Avon. Stock raising and the cultivation of pasture land are profitable in the Fen District, but Northamptonshire is principally an iron-producing county and also manufactures shoes and boots. Northampton (the capital), Peterborough, Wellingborough, Daventry, and Kettering are the principal towns. Pop., 1901, 294,506; 1911, 303,797. Consult *Victoria History of the County of Northamptonshire*, vols. i, ii (London, 1902–06).

NORTH AN′DOVER. A town in Essex Co., Mass., 28 miles north of Boston and 2 miles southeast of Lawrence, on the Merrimac River and on the Boston and Maine Railroad (Map: Massachusetts, E 2). It is important both as a residential place and as a manufacturing centre and contains the Stevens Memorial Library. There are several large woolen mills and manufactories of woolen-mill machinery. North Andover was set off from Andover and incorporated as a town in 1855, the original form of government, by town meeting, still prevailing. The water works are owned by the town. Pop., 1900, 4243; 1910, 5529.

NORTHANGER (nôrth′ăn-jẽr) **ABBEY.** A novel by Jane Austen (1818). It is a picture of commonplace English life in the latter part of the eighteenth century at Bath and at the abbey, designed to show that the everyday life of ordinary people could be made as interesting as the absurd romances, like the *Mysteries of Udolpho*, which were then popular.

NORTH AT'TLEBORO. A town, including several villages, in Bristol Co., Mass., 33 miles south-southwest of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 5). It has the Richards Memorial Library (public) and an Elks Home. There are manufactories of jewelry, of jewelers' supplies, cotton yarn, silverware, rope, etc. North Attleboro was incorporated in 1887. Pop., 1900, 7253; 1910, 9562.

NORTH BALTIMORE. A town in Wood Co., Ohio, 36 miles south of Toledo, on the Baltimore and Ohio and the Cincinnati, Hamilton, and Dayton railroads (Map: Ohio, C 3). It is a commercial centre, and the surrounding districts produce much oil. It has grain elevators, a cigar factory, flour mills, and manufactories of oil-well machinery and stone ballasts. Pop., 1910, 2503.

NORTH BATTLEFORD. A town in the electoral district of Battleford, Saskatchewan, Canada, situated at the junction of the Saskatchewan and Battle rivers and on the Canadian Northern Railway, about 230 miles northwest (direct) of Regina (Map: Saskatchewan, B 5). It possesses a government building and a collegiate institute. Its industrial establishments include sash and door factories, machine and engine works, brickyards, stone works, and manufactories of cement blocks and sills. The town owns its electric-light and power systems, water works, and markets. Pop., 1911, 2105; 1915 (civic census), 5868.

NORTH BAY. A town and the capital of Nipissing district, Ontario, Canada, on Lake Nipissing and on the Grand Trunk, the Canadian Pacific, and the Timiskaming and Northern Ontario railroads (Map: Ontario, F 1). It contains a normal school. Among its manufacturing establishments are a smelter, a foundry, a brick plant, car-repair and machine shops, planing and saw mills. It is situated in a lumbering and mining district. Pop., 1901, 2072; 1911, 7737.

NORTH BELLE ISLE. See BELLE ISLE.

NORTH BERWICK, bĕr′wĭk. A seaport, royal and police burgh in Haddingtonshire, Scotland, at the entrance to the Firth of Forth, 19 miles east-northeast of Edinburgh (Map: Scotland, F 3). North Berwick is a watering place, noted for its fine sandy beach and its 5-mile golf course. Near by are Bass Rock, North Berwick Law, and the ruins of Tantallon Castle, so graphically described in Scott's *Marmion*. The castle is an irregular pile, 2 miles east of the town, on a high rock, overlooking the sea. Pop., 1901, 2784; 1911, 3246.

NORTH BEVELAND. See BEVELAND.

NORTH BRABANT'. The largest province of the Netherlands, adjoining Belgium and occupying the northern part of Brabant (q.v.) (Map: Netherlands, D 3). Area, 1980 square miles. It has a low surface and belongs to the basin of the Meuse. Agriculture and the raising of domestic animals are the chief occupations. The chief manufactures are cotton and woolen fabrics, linen, hats, and leather. Pop., 1900, 553,842; 1910, 633,155; 1912, 649,305.

NORTH BRAD'DOCK. A borough in Allegheny Co., Pa., situated 10 miles by rail southeast of Pittsburgh, on the Pennsylvania Railroad (Map: Pennsylvania, B 6). It is for the most part a residential and manufacturing place, and has a large plant, making chiefly steel rails. Organized from a part of Braddock Township, North Braddock was incorporated in 1897; its government is administered by a burgess and a council. Pop., 1900, 6535; 1910, 11,824; 1914 (U. S. est.), 14,076.

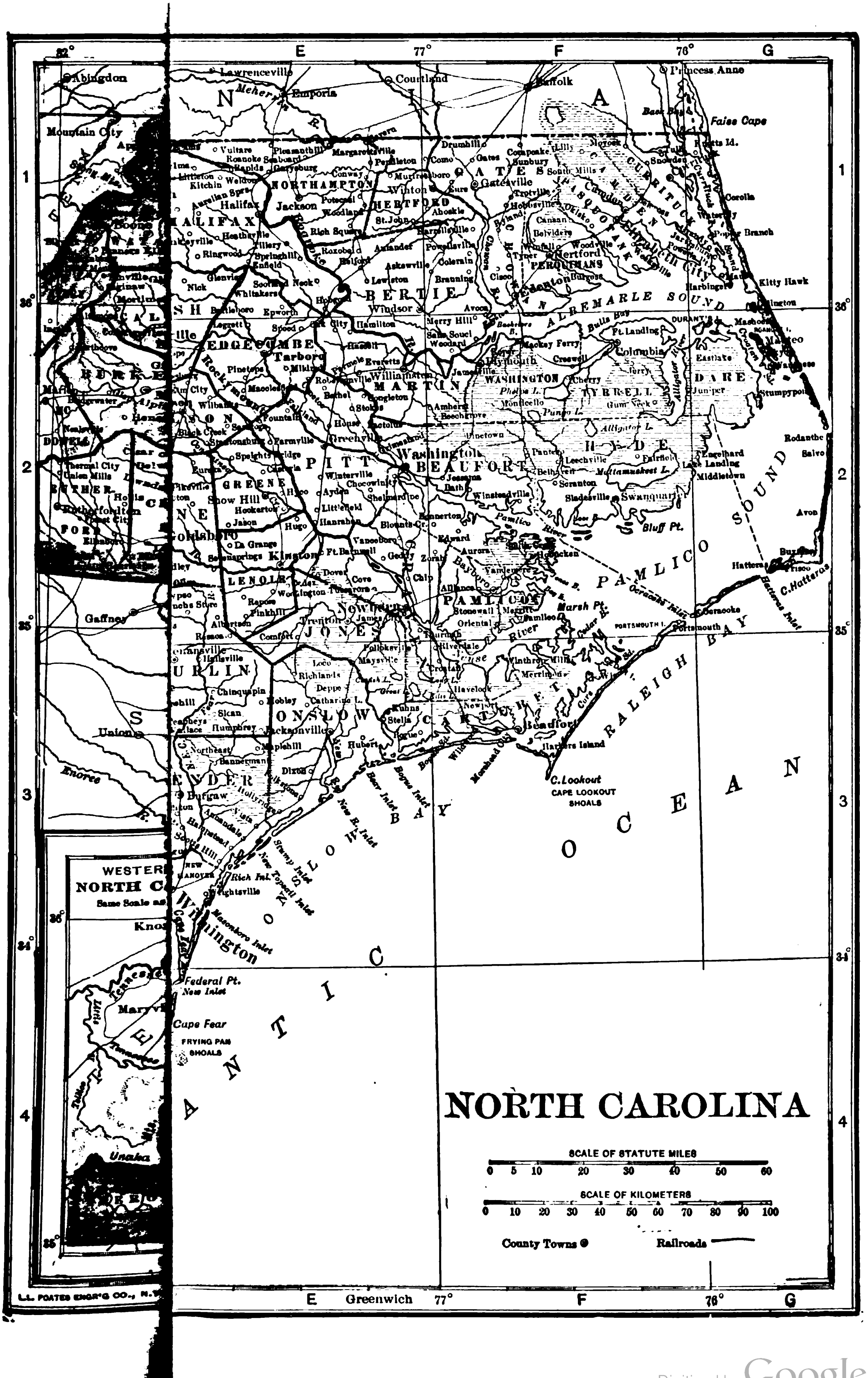
NORTH'BRIDGE. A town, including several villages, in Worcester Co., Mass., 12 miles southeast of Worcester, on the Blackstone and Mumford rivers and on the New York, New Haven and Hartford Railroad (Map: Massachusetts, D 4). The town has a public library and a hospital, and its industrial interests are represented by extensive manufactures of cotton-mill machinery, cotton, embossed paper, silk, etc. Settled in 1662, Northbridge was set off from Mendon and incorporated as a separate town in 1772. The government is administered by town meetings. The water works are owned and operated by the Whitin Machine Works, one of the town's great manufacturing plants. Pop., 1900, 7036; 1910, 8807; 1914 (U. S. est.), 9560.

NORTH BROOKFIELD. A town in Worcester Co., Mass., 15 miles west of Worcester, on the Quaboag River and on a branch of the Boston and Albany Railroad (Map: Massachusetts, B 3). It contains a public library. There are manufactories of rubber goods, linens, boots and shoes, and overalls. The water works are owned by the town. Pop., 1900, 4587; 1910, 3075.

NORTH CAPE. A promontory projecting into the Arctic Ocean from the island of Magerö (q.v.), off the north coast of Norway, in lat. 71° 11″ north (Map: Norway, H 1). It is generally considered as the northernmost point of Europe, though a little to the west of it a low point of land, the Knivskjoerodde, extends a few minutes farther north. The northernmost point of the European mainland is Cape Nordkyn, 44 miles east of North Cape, in lat. 71° 7′. North Cape is a precipitous rocky headland, rising 968 feet above the sea.

NORTH CAROLINA (popularly called the Old North State, also the Tar Heel State). A South Atlantic State of the United States. It lies between lat. 33° 50′ and 36° 33′ N. and long. 75° 27′ and 84° 20′ W. It is bounded on the north by Virginia, on the east and southeast by the Atlantic Ocean, on the south by South Carolina and Georgia, and on the west by Tennessee. Its extreme length from east to west is 503¼ miles, and its extreme breadth 187½ miles, the average breadth being about 100 miles. Its area is 52,426 square miles, including the large coast lagoons, the land surface covering 48,740 square miles, or 31,107,200 acres. Its gross area is, according to the latest official figures, exactly equal to that of Alabama, and is exceeded by 23 of the other States. In land area North Carolina ranks twenty-fifth.

Topography. The State occupies the central and broadest portion of the Atlantic border region, extending from the crest of the Great Smoky Mountains to the sea. It thus includes within its borders three distinct physiographic regions of the United States—the Appalachian region in the west, the piedmont plateau region in the middle, and the coastal-plain region in the eastern half. These three well-marked natural divisions were recognized by the earliest in-


NORTH CAROLINA
SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
County Towns ●
Railroads
E
77°
F
76°
G
Greenwich
1
2
3
4
36°
35°
34°
WESTERN NORTH C
Same Scale as
L.L. POATES ENGR'G CO., N.Y.
ATLANTIC OCEAN
ONSLOW BAY
RALEIGH BAY
PAMLICO SOUND
ALBEMARLE SOUND
C. Lookout
CAPE LOOKOUT SHOALS
Cape Fear
FRYING PAN SHOALS
Federal Pt.
New Inlet
C. Hatteras
Hatteras Inlet
Ocracoke Inlet
Kitty Hawk
False Cape
NORTHAMPTON
HERTFORD
GATES
CURRITUCK
CAMDEN
PASQUOTANK
PERQUIMANS
CHOWAN
BERTIE
HALIFAX
EDGECOMBE
MARTIN
WASHINGTON
TYRRELL
DARE
HYDE
BEAUFORT
PITT
GREENE
LENOIR
JONES
PAMLICO
CRAVEN
CARTERET
ONSLOW
PENDER
NEW HANOVER
Wilmington
New Berne
Washington
Elizabeth City
Edenton
Plymouth
Tarboro
Kinston
Goldsboro
Greenville
Beaufort
Suffolk
Emporia
Lawrenceville
Princess Anne
Abingdon
Mountain City
Gaffney
Union
Enoree
Unaka

habitants, who settled first in the low country, moved later into the up country, and finally peopled the mountains, and these are the names by which these three divisions are to-day known by the people of the State. The east and west boundaries are naturally limited by the Atlantic Ocean and the Unaka, or Great Smoky Range, which presents a fairly continuous front to the northwest and reaches a far greater average altitude than any other range in the entire Appalachian system of mountains, though it does not constitute a watershed. The length of this border line of mountains is about 225 miles, while the eastern shore line, a chain of long, narrow barrier beaches, is 325 miles in length.

The mountain belt, taken as a whole, consists of a high plateau covering about 6000 square miles and lying at an average elevation of 2000 to 5000 feet. It is bounded on the east by the Blue Ridge, which rises in a steep and rugged escarpment from the piedmont plain to a height of nearly 4000 feet above sea level in the north, becoming lower to the south. The plateau itself is much dissected by river valleys running in all directions and is broken up into cross ranges and irregular mountain groups. These are generally rounded, forest-covered heights, but there are several pointed peaks and some precipitous slopes and rocky cliffs. More than 25 peaks are over 6000 feet high. Their summits are generally bare. The highest is Mount Mitchell, in the group known as the Black Mountains, the culminating point of the Appalachian system and the highest peak in the eastern half of the continent. It rises from the State's central plateau to a height of 6711 feet above the sea.

The portion east of the mountain belt is about equally divided between the piedmont and the coastal plains. The former reaches its widest development in this State, of whose area it includes nearly one-half. It slopes gradually from an elevation of 1000 feet at the foot of the Blue Ridge to less than 500 feet where it merges into the coastal plain. Its surface is undulating, rugged, and hilly near the mountains, but gradually becomes level towards the east. From this gently rolling peneplain rise residual hills, or monadnocks, composed of igneous rocks in the eastern portion and of metamorphosed sedimentaries (Early Paleozoic) in the western portion. Its area is partly forested, but consists largely of cultivated land, being the most populous and best-developed region of the State. The coastal plain occupies the eastern belt, stretching from 100 to 150 miles from the coast. It is divided from the piedmont plateau by a fall line, which has a very irregular course across North Carolina, but lies in a general southwesterly direction from the Falls of Roanoke on the north to Anson County on the South Carolina border. The drop from the piedmont to the coastal plain along this fall line is about 200 feet in a few miles. The coastal plain is level and sandy, consisting in parts of pine barrens, and is less than 500 feet in elevation. It merges through low swamps into the shallow coast lagoons, of which Pamlico and Albemarle sounds are the largest. This coastal-plain region is the only part of the State that has any lakes, and these are chiefly shallow bodies of water, with sandy bottoms in the midst of swamps. They number 15 and have an area of 200 square miles, about one-half of which is in Lake Mattamuskeet in Hyde County. The so-called lakes in the mountains are artificial.

Hydrography. The greater part of the State belongs to the Atlantic slope, but the western mountain region beyond the Blue Ridge belongs to the Mississippi basin, being drained by the head streams of the Tennessee River, chief among which are the Little Tennessee and the French Broad River. The east slope of the Blue Ridge in this State is the watershed for nearly all the Atlantic rivers of both North and South Carolina, all of them having a generally southeasterly course. In the north half the Roanoke, the Tar, and the Neuse enter Albemarle and Pamlico sounds through deep and wide estuaries. The south portion is drained by the Cape Fear River and the western part of the piedmont plain by the Yadkin or Great Peedee and the Catawba, both of which flow into South Carolina. The large rivers of the coastal plain, especially their magnificent estuaries, offer facilities for communication, and on the piedmont plain they furnish a vast amount of water power.

Soil. The sandy soil of the Coastal Plain contains varying quantities of silty and fine sandy loams. The mountainous region of the west is covered mostly with forest and consists of soils of clayey nature.

Climate. North Carolina lies in the warmer part of the temperate zone. The climate becomes almost subtropical in the southeast corner. The mean temperature near the coast is 61° F. and in the mountains 56° F.; the mean summer temperatures for the two regions are 77° F. and 72° F. and the winter temperatures 45° F. and 40°F. The normal maximum is about 100° F. and the minimum for the central part of the State 10° F., though such cold is rare. In the mountains the winters are more severe, but the Blue Ridge protects the rest of the State from the cold northwest waves. The rainfall is abundant and very evenly distributed, both in regard to seasons and localities, though the central region receives somewhat less rain than the coast and mountain regions and the summer somewhat more than the other seasons. The annual average for the State is 53.3 inches. The average snowfall is about 5 inches, but snow rarely remains on the ground more than one or two days. The prevailing winds are from the northeast and southwest. The State lies outside the path of the cyclonic storms, and tornadoes are rare, but subtropical storms sometimes endanger coast navigation.

Flora. North Carolina, being the meeting ground of the temperate and subtropical floras, and having all varieties of climate from subtropical to subarctic, is unrivaled by any State east of the Mississippi in the variety of its plant life, and is probably surpassed by no region of similar area elsewhere. In the swamps along the coast the prevailing tree is the bald cypress, with the white cedar and black gum. Here also are numerous sedges and several species of carnivorous plants (*Sarracenia Dionæa, Drosera*). In the sandy parts of the coastal plain the long-leaf pine (*Pinus palustris*) is predominant, together with the loblolly pine (*Pinus tæda*) and scrub oak. Composite and leguminous plants are here abundant, as well as blueberries, sumacs, alders, a profusion of wild grapes and other vines, and, in the south palmettos. In the piedmont plain the indigenous species have been largely supplanted by those introduced by settlers. Oaks, hickories, and elms are predominant in the forests of this plain. In the mountains the forest of the common northern trees covers a remarkable and typical northern undergrowth of gorgeous shrubbery, magnolias, rhododendrons, and similar species. See POSCIN.

For fauna, see UNITED STATES, *Fauna*.

Geology and Mineralogy. The main geological surface formations are coincident with the topographical belts described above; in fact, the latter are a result of the former, and the coastal plain is a geological rather than a topographical division. It consists of Cretaceous and Tertiary sands, gravels, clays, and marls covering the underlying bedrocks of granites and schists—the Pre-Cambrian. The remainder, the piedmont plain and the mountains, has as its principal feature an immense belt of granites and gneisses running across the State from southwest to northeast and flanked on the east by a narrower belt of crystalline schists and sheared volcanics. Between the latter and the coastal-plain deposits is a still narrower belt of more recent formation, the Triassic red sandstone. The Great Smoky Mountains in the extreme west, the south portion of the Blue Ridge, and the west half of the piedmont region consist of rocks of Pre-Cambrian age and of early Paleozoics. The red sandstone formation contains coal deposits and also yields the most valuable building stones. The crystalline rocks, which are much folded, tilted, and broken, are penetrated in many places by quartz veins, some of which are auriferous. Other veins are impregnated with copper ores, and valuable iron deposits are also found in both the granite and slate belts, while ores of silver, lead, and zinc are also found, sometimes associated with gold.

Mining. The State is not important as a producer of minerals. The value of the clay products in 1914 amounted to $1,625,627, and constituted nearly one-half of the total mineral output. North Carolina leads in the production of kaolin, which is mined in Jackson, Macon, Mitchell, and Swain counties. Second among the mineral products is stone, more than 90 per cent of which is granite. The total output of the quarries in 1914 was valued at $1,286,345. In that year North Carolina ranked first in the production of mica, the value of which was $195,270. The white mica of the State is known as the standard mica, equal in quality to any in the world. North Carolina has continued for some years to show an increase in the production of gold. Prior to the discovery of gold in California it was one of the leading gold-producing States, and recent developments in the piedmont section give indications that gold mining will again assume considerable importance. In 1914 North Carolina easily ranked first among the Eastern States in the production. The total output in that year amounted to 6343 fine ounces, valued at $131,141. The iron-ore production of North Carolina is a magnetic ore of the Cranberry iron mine in Avery County. There is a constantly increasing demand for the pig iron made from this ore, as it is especially adapted to certain uses for which exceptionally pure pig is required. The other mineral substances produced on a commercial scale are silver, lead, copper, feldspar, abrasive garnet, gems, lime, millstones, mineral waters, quartz, sand and gravel, talc, and soapstone. The total value of the mineral products in 1914 was $3,748,824.

Agriculture. Of an approximate land area of 31,193,600 acres 22,439,129 acres were in farms in 1910. The total number of farms in 1910 was 253,725, of which the improved land amounted to 8,813,058 acres. The average acreage per farm in 1910 was 88.4 and the average value of farm land per acre was $15.29. The total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was, in 1910, $537,716,210. Of the total number of farms 146,438 were operated by owners and managers and 107,287 by tenants. Of all land in farms 19,253,325 acres were operated by white farmers and 3,185,804 acres by negroes. Of all land operated by white farmers 75.1 per cent was operated by owners and 22 per cent by tenants, while of that operated by negroes 37.6 per cent was operated by owners and 61.8 per cent by tenants. About one-fourth of the farms are from 50 to 99 acres in size. The native white farmers in 1910 numbered 187,657 and the foreign-born white farmers numbered only 412, while negro and other nonwhite farmers numbered 65,656.

The following table gives the acreage, production, and value of important crops as estimated for 1914 by the United States Department of Agriculture.

CROPS	Acreage	Prod. bu.	Value
Corn	2,835,000	57,550,000	$49,493,000
Wheat	611,000	7,332,000	8,578,000
Oats	250,000	4,375,000	2,844,000
Potatoes	33,000	1,716,000	1,579,000
Sweet potatoes	76,000	6,840,000	4,446,000
Hay	320,000	*368,000	6,293,000
Tobacco	265,000	†172,250,000	19,809,000
Cotton	1,600,000	‡ 950,000	31,248,000

* Tons. † Pounds. ‡ Bales.

The total value of farm crops in 1909 was $142,890,000 and the combined acreage was 5,737,037, representing 65.1 per cent of the total improved land in farms. The acreage of cotton was 1,274,404 in 1910. The production was 665,132 bales, valued at $42,066,099. This constituted about one-third of the total value of crops in that year. The cottonseed produced was valued at $8,417,246. Corn, the leading cereal, had an acreage of 2,459,459 and a production of 34,003,531 bushels, valued at $31,286,102. The third crop in importance was tobacco. In 1909 there were 221,890 acres, which produced 138,813,163 pounds of tobacco, valued at $13,847,559. In the production of tobacco North Carolina ranked second only to Kentucky in 1913, holding this rank since 1894. Peanuts had an acreage of 195,134 and a production of 5,980,919 bushels, valued at $5,368,826. Wheat ranks second among the cereals. In 1909, 501,912 acres were sown, producing 3,827,145 bushels, $4,420,322 in value. Hay and forage had an acreage of 375,795 and a production of 369,332 tons, valued at $4,781,562. Potatoes are grown quite generally. The total acreage of potatoes and other vegetables in 1909 was 212,710, with a production valued at $12,585,018. Excluding potatoes, sweet potatoes, and yams, the acreage of vegetables was 95,980, with a production valued at $6,496,000. Of orchard fruits there were grown 6,324,301 bushels, valued at $3,248,036. The most important of the orchard fruits is the apple, of which 4,475,693 bushels, valued at $2,014,670, were grown in 1909. The peach crop amounted to 1,344,410 bushels, valued at $1,041,767. Other orchard fruits are pears, plums, and prunes, and cherries. The grape production was 15,116,920 pounds, valued at $336,083. The only tropical fruit grown is figs, the production of which was 660,624 pounds, valued at $22,632. The most important of the small fruits is the strawberry, of which there were grown 10,313,361 quarts, valued at $712,126. Next in importance are blackberries and dewberries. The total quantity of small fruits grown in 1909 was 12,827,427 quarts, valued at $853,076. There were grown in the same year 86,462 pounds of sorghum cane, from which were made 1,099,346 gallons of syrup, valued at $524,667. There is also a small amount of sugar cane grown.

Live Stock and Dairy Products. The total value of live stock on farms in 1910 was $60,050,731. On Jan. 1, 1915, it was estimated that there were 369,000 cattle other than milch cows, valued at $6,273,000; milch cows, 315,000, with a value of $11,498,000; horses, 182,000, valued at $23,660,000; mules, 194,000, valued at $20,294,000; sheep, 177,000, valued at $584,000; swine, 1,525,000, valued at $15,505,000. The total number of all kinds of fowls in 1910 was 5,053,870, valued at $2,212,570. The total value of the milk, cream, and butter fat sold and butter and cheese made in 1909 was $5,789,583. Milk sold amounted to 2,380,029 gallons, valued at $548,526, and butter made to 26,059,585 pounds, valued at $5,213,783.

Fisheries. In 1908 North Carolina ranked eleventh in value of fishery products. The Albemarle, Pamlico, and Core sounds and their tributary rivers furnish ample fishing grounds. Most important among these products is shad, the catch of which in 1908 was valued at $373,000. Second in importance is the oyster, the value of the production of which was $236,000. Some other varieties taken and their value in 1908 are as follows: squeteague, $206,000; mullet, $175,000; alewives, $140,000. In point of value more than 90 per cent of the production is from boat and shore fisheries. The total value of products in 1908 was $1,776,000. The total number of persons employed was 9681 and the total capital invested $1,270,000.

Forest Products. In the production of lumber and timber North Carolina is one of the most important States. In 1909 it occupied seventh place in the number of establishments engaged in this industry. The total amount of rough lumber cut was 2,177,715 M feet. There were also cut 70,724 thousands of lath and 280,942 thousands of shingles. Over 80 per cent of the total cut was soft wood, and of this the greater part was yellow pine. Of the hard wood about one-half was oak. In addition to these figures there were produced in 1909 on the farms forest products valued at $5,414,460.

Manufactures. North Carolina, because of its rapid growth in this branch of industry, has advanced among the leading manufacturing States of the South. The gross value of products per capita in 1909 was $98. Harbors, rivers, and railway systems are important factors in furthering manufacturing and commercial interests, and the streams furnish abundant water power, the use of which has increased decidedly. The large local supply of fuel adds greatly to possibilities of manufacturing industries. The following table gives the most important figures relative to manufactures for 1904 and 1909.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	4,931	133,453	121,473	$217,186	$34,355	$216,656	$94,795
	1904	3,272	93,142	85,339	141,001	21,375	142,521	63,253
Carriages and wagons and materials	1909	138	1,922	1,629	3,168	603	3,283	1,389
	1904	125	1,597	1,373	2,010	482	2,304	1,075
Cotton goods, including cotton small wares	1909	281	48,525	47,231	96,993	12,131	72,680	23,992
	1904	212	37,292	36,356	57,413	7,504	47,254	14,229
Fertilisers	1909	34	1,117	933	7,680	393	6,316	2,133
	1904	27	1,019	908	3,698	282	3,099	881
Flour-mill and gristmill products	1909	249	971	496	2,643	180	8,501	1,214
	1904	234	967	519	1,990	160	6,864	878
Furniture and refrigerators	1909	117	6,023	5,533	7,606	1,585	7,885	3,487
	1904	105	5,493	5,164	4,622	1,311	6,182	3,076
Hosiery and knit goods	1909	62	5,361	5,151	5,164	1,080	5,152	2,140
	1904	40	3,084	2,944	2,081	617	2,484	1,089
Leather, tanned, curried, and finished	1909	39	938	832	6,753	290	5,415	1,259
	1904	34	616	534	2,569	149	2,662	624
Lumber and timber products	1909	2,544	38,636	34,001	29,675	9,707	33,525	20,991
	1904	1,364	19,560	16,983	12,008	5,119	19,489	12,877
Oil, cottonseed, and cake	1909	53	1,446	1,165	4,432	326	8,504	1,414
	1904	43	1,027	867	3,118	233	3,749	793
Tobacco manufactures	1909	43	9,065	8,203	23,162	1,918	35,987	22,171
	1904	55	7,899	7,293	36,077	1,457	28,088	17,939

In 1909 North Carolina ranked second in value of products among the cotton-manufacturing States, first in the number of establishments, and third in the number of producing spindles. The total amount of raw cotton used in these manufactures in 1909 was 348,979,258 pounds, which cost $40,605,341. The total value of the products was $72,680,385. There were produced 104,895,423 square yards of plain cloths, 164,707,838 yards of brown or bleached sheetings or shirtings, 111,994,426 square yards of ginghams, and 142,312,450 pounds of yarns. The largest single product of the mills is cotton yarns. The total number of producing spindles used in cotton manufactures in 1909 was 2,908,383. The second industry in point of value of products is the manufacture of tobacco. It is interesting to note that the cotton-goods and tobacco manufacturing industries combined, two industries depending almost entirely upon agricultural products of the State for raw material, represent 50.2 per cent of the total value of all manufactured products. Statistics in regard to lumber and timber products will be found in the section on *Forest Products*, above. North Carolina holds seventh place among the States in the value of its cottonseed products. Some of the more important industries not mentioned separately in the table are car and general shop construction and repairs, foundry and machine-shop products, and printing and publishing.

The total number of wage earners in 1909 was 121,473, of whom 93,787 were males. The wage earners under 16 years of age numbered 13,698, of whom 7705 were males. The largest number of wage earners under 16 years of age were employed in the hosiery and knit goods, cotton goods, and tobacco manufactures. The prevailing hours of labor for most of the wage earners were 60 or more a week. Out of a total average number of wage earners employed in the cotton-goods industry, 39,680 were in establishments where the prevailing hours of labor were over 60 per week. The seven cities having a population of over 10,000—Charlotte, Wilmington, Raleigh, Asheville, Durham, Winston-Salem, and Greensboro—contained 15.5 per cent of the average number of wage earners and produced 28.2 per cent of the total value of its manufactures. The most important manufacturing city is Durham, the total value of the manufactured products of which in 1909 was $23,271,525. While its importance comes chiefly from the tobacco factories, it has also cotton and hosiery and knitting mills. The value of the products of Winston-Salem, the second city in importance, was $16,778,072. As in Durham, the most important industry in this city is tobacco manufactures. Further details in regard to the manufactures of these cities will be found under their titles in other portions of this work.

Transportation. The total mileage of steam-railroad track in 1914 was 5265. The most important roads are the Southern lines (mileage, 1346); the Atlantic Coast Line System (mileage, 1031); the Norfolk Southern (mileage, 851); the Seaboard Air Line (mileage, 616). A number of the rivers are navigable through the coastal-plain region, and with the coast waters are of importance in local commerce. There are two customs districts—Wilmington and Pamlico.

Banks. There were no banks in North Carolina until 1804, when two were chartered. The State subscribed for shares in both. The State Bank of North Carolina was organized in 1810 in Raleigh, with branches in six towns. In this bank also the State was heavily interested, as its notes were the main currency in the commonwealth. There were 31 banks in 1861, but the vicissitudes of the next four years destroyed their financial standing. In 1866 an Act was passed enabling them to close their business. A revival of banking came only during 1890–1900.

The condition of the banks in 1914 is shown in the following table.

1912	National banks	State banks	Savings banks
Number	75	355	28
Capital	$8,970,000	$7,274,000	....
Surplus	3,401,000	2,643,000	519,000
Cash, etc.	1,864,000	2,034,000	203,000
Deposits	32,101,000	40,217,000	10,152,000
Loans	46,704,000	44,537,000	10,254,000

Government. The present constitution was formulated in 1868 and amended in 1875, 1879, 1888, and 1899. Whenever two-thirds of the members of each House and a majority of the voters favor it, a constitutional convention may be called. Concurrence of three-fifths of the members of each House and a majority of the qualified voters is required to carry an amendment to the constitution.

Legislative.—The legislative power is vested in the General Assembly, consisting of the Senate and the House of Representatives. The General Assembly meets biennially. The Senate is composed of 50 members and the House of Representatives of 120 members. Both Houses are biennially chosen. Members of the Senate must be at least 25 years of age and must have resided in the State as citizens two years. Members of the House of Representatives must have resided in the county in which they are chosen for one year preceding their election.

Executive.—The executive department consists of the Governor, in whom is vested the supreme executive power, the Lieutenant Governor, the Secretary of State, Auditor, Treasurer, Superintendent of Public Instruction, and Attorney-General, all elected for a term of four years. The Governor and Lieutenant Governor must be at least 30 years old and must have been citizens of the United States for five years and residents of the State for two years. Neither may succeed himself in office. The Secretary of State, auditor, Treasurer and Superintendent of Public Instruction constitute a council of state with the duty of advising the Governor, whose power is limited by this council. The Governor has no veto and little appointive power.

Judiciary.—The judicial power is vested in the supreme court, superior courts, district courts and justices of the peace, and such inferior courts as may be established by law. The supreme court consists of a Chief Justice and four associate justices elected for a term of eight years. The State is divided into 20 judicial districts, for each of which a judge is elected for a term of eight years.

Suffrage and Elections.—Every male citizen of the United States 21 years of age who has resided in the State for two years, in the county six months, and in the precinct, ward, or election district four months preceding the election, and who is able to read and write any section in the Constitution in the English language, and has not been convicted of crime, is entitled to vote. Persons who deny the existence of a God are not permitted to hold office. General elections for State officers are held on the first Monday in November every four years dating from 1904. County officers, solicitors, and Congressmen are elected on the Tuesday following the first Monday in November and every two years after 1906. There is a State board of elections appointed by the Governor, which has general charge of elections in the State. Special elections may be held in pursuance of a writ from the Governor. The Legislature of 1915 passed a primary-election law applying to State officers, Representatives in Congress, district officers, and members of the General Assembly. Primary elections are held on the first Saturday in June next preceding the general election. Provision is made for a preference vote for President and Vice President.

Local and Municipal Government.—In each county there are elected biennially a treasurer, registrar of deeds, surveyor, and five commissioners. The commissioners exercise a general supervision over the penal and charitable institutions, schools, bridges, roads, levying of taxes, and finances of the county.

Miscellaneous Constitutional and Statutory Provisions.—Corporations may be formed under general laws, but shall not except for municipal purposes be created by special act. A wife holds property which she has acquired before marriage free from any obligation to her husband, but she is not permitted to make contracts affecting her personal or real estate without the written consent of her husband. There is a child-labor law prohibiting employment of children under 12 years of age in factories and also those under 16 between 9 P.M. and 6 A.M. The State is under statutory prohibition, which makes illegal not only the sale but also the manufacture of intoxicating liquors. There is a strong search and seizure law making over a gallon of liquor in one's possession prima facie evidence of guilt.

Finances. North Carolina had no debt until the advent of the epoch of railroad building. In 1848–58 several issues of bonds were authorized in aid of railroad, plank road, and canal companies, and as security the State received stock in these companies. At the beginning of the Civil War the debt of the State amounted to $18,167,000. The financial troubles of the war greatly aggravated this condition, but the enormous loans for war purposes were repudiated by order of President Johnson in 1865. Great injury to the finances of North Carolina was done during the five years of the carpetbag régime that followed. Large issues of bonds for purposes of railroad construction followed one another in rapid succession. The constitution of 1868 forbids the issue of any bonds unless a special tax for payment of interest be levied. But this did not stop the growth of the debt, for in the following two years more than $16,000,000 of the special-tax bonds were issued. Another cause for issuing bonds was the refunding of old obligations and their unpaid coupons. Altogether, in 1865–70, $24,375,800 of bonds were issued, and the total debt exceeded $42,000,000. As against this the State held $22,000,000 of railroad stocks, out of which only $3,000,000 paid dividend. The rest were worthless, as the money obtained from sale of the State bonds was squandered. The burden of the interest on these bonds lay very heavily upon the State, and there was constant defaulting.

This condition of affairs caused great popular dissatisfaction and a tendency towards repudiation. Payment of interest on the special-tax loans was stopped in 1870, the special-tax laws were repealed, and all the efforts of the bondholders to enforce payment through courts remained futile. In 1879 a compromise was reached with regard to the rest of the State debt. Under this compromise the old bonds were refunded at the rate of 15 per cent to 40 per cent, according to issues. The conversion proceeded from 1880 to 1900 and the debt remained almost the same. The compromise has improved the finances considerably. The budget of the State is small, but instead of the large deficits there is a small surplus. On June 30, 1913, the State debt was $8,058,430. The total receipts for the year were $3,825,000; expenditures, $3,753,000; the balance in the treasury, $53,787. The main sources of income are a general property tax (about 40 per cent), North Carolina Railroad dividends (10 per cent), railroad and corporation taxes, earnings of the State prison, etc.

Militia. The males of militia age in 1910 numbered 392,192. The organized militia included a brigade of infantry comprising three regiments, two troops of cavalry, six companies of coast artillery, and a company of sanitary troops, including a field hospital. The total strength of enlisted men in 1914 was 2367 and 209 officers.

Population. In population North Carolina ranked sixteenth in 1910. The population at each census was as follows: 1790, 393,751; 1800, 478,103; 1810, 555,500; 1820, 638,829; 1830, 737,987; 1840, 753,419; 1850, 869,039; 1860, 992,622; 1870, 1,071,361; 1880, 1,399,750; 1890, 1,617,949; 1900, 1,893,810; 1910, 2,206,287. The estimated population on July 1, 1915, was 2,371,095. In 1910 the population per square mile was 45.3. The urban population (places of 2500 or more) was 318,474, the rural 1,887,813. The native whites numbered 1,494,569, the foreign-born whites 5942, the negroes 697,843, the Indians 7851. Of the total population about 95 per cent was born in the State. Of those born in other States South Carolina furnished 1.9 per cent and Virginia 1.4 per cent. By sex the population is divided into 1,098,476 males and 1,107,811 females. Males of militia age numbered 392,192, those of voting age 506,134. There were in 1910 only seven cities with a population of 10,000 or over. These with their population for 1910 and 1914 (estimated) are as follows: Charlotte, 34,014 and 37,951; Wilmington, 25,748 and 27,781; Winston-Salem, 22,700 and 29,034; Raleigh, 19,218 and 19,833; Asheville, 18,762 and 20,157; Durham, 18,241 and 22,863; Greensboro, 15,895 and 18,391.

Education. The negro problem and the difficulties pertaining to a widely scattered rural population have affected educational conditions in North Carolina as in other southern States. In 1910, 291,477 persons over 10 years of age were illiterate. Illiterate native whites of native parentage numbered 131,982, negro illiterates 156,303. There were, in 1910, 785,583 persons of school age (6 to 20 years), of which 481,450 attended school. The report of the State superintendent for the school year 1913–14 gives a total school population in that year of 778,283, of which 525,107 were white. The total enrollment in schools for white children was 409,728 and in schools for negro children 189,918. The total number of teachers employed was 13,255, of whom 10,082 were white. The white men employed as teachers numbered 2279 and white women 7853. There were 830 colored men and 2343 colored women employed. The total expenditure for education was $5,566,992. Separate schools are maintained in Robeson County for the Croatan Indians. Indian children of school age in 1914 numbered 2498, of whom 1854 were enrolled in schools.

The school system is under the supervision of a State Board of Education, which consists of the Governor, Lieutenant Governor, Secretary of State, Treasurer, Auditor, Attorney-General, and the Superintendent of Public Instruction, who is the chief executive. Each county has a county superintendent, who is the business and professional head and director of the county school system. The compulsory-education law compels the attendance of children of school age for a term of four to eight months each school year for four to six continuous years. Any county which meets certain requirements may avail itself of a State appropriation not to exceed the maximum of $2500 for instruction in agriculture, sewing, cooking, household economics, and other farm-life subjects in connection with one or more rural high schools. In 1914 there were 15 farm-life schools in 12 counties. The State Normal and Industrial College at Greensboro and the East Carolina Teachers Training School at Greenville are the normal schools for the training of white teachers. For colored teachers there are the State Colored Normal School at Elizabeth City and Slater University, and State Normal Schools at Winston-Salem and Fayetteville. Institutions of collegiate rank are the University of North Carolina at Chapel Hill, Davidson College at Davidson, Trinity College at Durham, Elon College at Elon, Guilford College at Guilford, Lenoir College at Hickory, Catawba College at Newton, Meredith College at Raleigh, Wake Forest College at Wake Forest, and St. Mary's College (Roman Catholic) at Belmont. Colleges for women are Elizabeth College at Charlotte, Presbyterian College for Women at Charlotte, Greensboro Female College at Greensboro, Meredith College at Raleigh, Presbyterian College at Red Springs, and Salem Academy and College at Winston-Salem. The College of Agriculture and Mechanic Arts at West Raleigh is a State institution. Biddley University at Charlotte and Shaw University at Raleigh are for negro students.

Charities and Corrections. The charitable and correctional institutions include hospitals at Morganton, Raleigh, and Goldsboro, the School for the Feeble Minded at Kingston, schools for the White Blind and for the Colored Blind and Deaf, and the Soldiers Home at Raleigh, the Tuberculosis Sanitorium at Aberdeen, the Stonewall Jackson Training School at Concord, an Orphanage for Colored Children at Oxford, School for the White Deaf at Morganton, and a State prison at Raleigh. The total number cared for in these institutions in 1914 was 7238. Prisoners are cared for in county convict camps. There were in 1915 about 1414 colored and 281 white prisoners in these camps. In addition to the public institutions there are many private hospitals and homes which are under the indirect supervision of the board of public charities.

Religion. The leading religious denominations are the Baptist and the Methodist, comprising respectively about one-half and one-third of all church members. The Presbyterians, Lutherans, Disciples of Christ, Episcopalians, Congregationalists, and Roman Catholics are also represented.

History. On July 4, 1584, Philip Amadas and Arthur Barlow, sent by Sir Walter Raleigh under a charter granted by Queen Elizabeth to make explorations in America, dropped anchor off the present coast of North Carolina. The next year a colony of men was sent out under Ralph Lane to make a permanent settlement. They made no attempt to provide a food supply, and in 1586 abandoned the settlement which they had founded on Roanoke Island. The next year John White was sent with men, women, and children. He went back to England for supplies, but on his return the colony had utterly vanished; tradition relates that they were absorbed by an Indian tribe in the neighborhood. In 1629 Charles I granted to Sir Robert Heath, under the name of Carolina, the territory between lat. 31° and 36° N., but the proprietor failed to make use of his grant, and in 1663 Charles II conferred on eight Lords Proprietors the territory between lat. 31° and 36° N., extending to the Pacific Ocean. The limits were enlarged in 1665 to lat. 29° to 36° 30′ N. The proprietors received palatine powers, divided the territory into two parts, North and South Carolina, and began to send out settlers. For the government of the Colony an elaborate scheme, the Fundamental Constitution, was drawn up by the philosopher John Locke.. This provided for three orders of nobility and four houses of Parliament. It was never put fully into operation and was abandoned entirely in 1693. The population was hardy and rude and paid little attention to any sort of government, occasionally driving away an obnoxious Governor by force. Up to 1710, when Edward Hyde was appointed Governor of North Carolina, there was but one Governor for Carolina, with deputies for the divisions. In 1711 the Tuscarora Indians had fallen upon the farms and massacred several hundred people, and the power of the Indians was broken only by aid from Virginia and South Carolina. See MOORE, JAMES.

Carolina did not prove a success from a financial standpoint, and in 1728 seven of the proprietors sold to the crown their shares for £2500 each. Lord Carteret (afterward Lord Granville) retained his, and in 1744 it was laid off in severalty for him. Affairs were more settled after the crown assumed control, and the western portion of North Carolina began to receive settlers, largely Scotch-Irish from Pennsylvania and Germans from the Palatinate. After the battle of Culloden (1746) a number of Scotch settled on the upper Cape Fear River. Many of the royal governors came into conflict with the inhabitants, and during the administration of William Tryon the Regulators (q.v.) threatened to overturn the government in 1771.

The first Provincial Congress met in defiance of Governor Josiah Martin (q.v.) in 1774 and sent delegates to the Continental Congress. (See MECKLENBURG DECLARATION OF INDEPENDENCE.) The Colony was the first to authorize her delegates in Congress to vote for independence, on April 12, 1776, and a State constitution was adopted on Dec. 18, 1776. North Carolina troops took part in many of the important battles of the war, and in 1780–81 the State was invaded by the British. Delegates were sent to the national Constitutional Convention in 1787, but refused to ratify the instrument in 1788 and presented 26 amendments. The State did not vote in the first presidential election, but after the adoption of the first 10 amendments to the Constitution ratified that instrument on Nov. 19, 1789. The western lands, now the State of Tennessee, were offered to Congress in 1784. The inhabitants, indignant at being transferred without their consent, revolted and set up the State of Franklin. Governor Caswell was able to cause the dissolution of this abortive State, and the lands were again ceded in 1790. The next year the capital was located at Raleigh. In 1795 the State University was opened for students. The question of a market for their products was a serious one to the residents of the middle and eastern counties. After 1820 much money was spent in the fruitless attempt to make the shallow rivers navigable and to connect them by canals. The measures were opposed by the eastern counties, which had abundant water transportation. The question of constitutional revision was one of great interest for a long time. The constitution of 1776 gave equal representation to every county, and this gave an unfair advantage to the smaller counties of the east. After much effort the Convention of 1835 was called and drafted a constitution giving representation in the Senate according to property and in the House according to population.

The State opposed secession as a matter of expediency, and in February, 1861, refused to call a convention, but with President Lincoln's demand for troops to coerce the seceding States sentiment changed. An ordinance of secession was unanimously passed, May 20, and the State lost the first soldier of the war at Big Bethel. North Carolina furnished more than 120,000 soldiers to the Confederate cause, nearly twice her proportion, lost more soldiers than any other Southern State, and during the last year of the war practically fed Lee's army. At the close of the war W. W. Holden, formerly a rabid secessionist, was appointed provisional Governor. A convention was called which repealed the ordinance of secession, abolished slavery, and ordered an election for State officers. Jonathan Worth was elected Governor, but in the following year the new constitution was rejected. With the beginning of reconstruction in 1867 the civil authority was superseded by the military. Another convention was called in 1868, and a constitution allowing negro suffrage was adopted. Under this W. W. Holden was elected Governor. In this year the Ku-Klux Klan (q.v.) appeared, and Alamance and Granville counties were placed under martial law. The conservative Democrats secured the Legislature in 1870, and Governor Holden was impeached. The present constitution was adopted in 1876, and in 1900 a clause intended to restrict negro suffrage was added. The State has been Democratic in national elections since the beginning of parties, with the exception of the years 1840–48, when it voted for the Whig candidates, and 1868–72, when its vote was cast for Grant. The Legislature of 1907 passed several radical measures for the regulation of railroads traversing the State. The attempted enforcement of these laws by the State authorities brought them into conflict with the Federal government (see Railways; State Rights), and in 1908 the United States Supreme Court declared the laws unconstitutional.

The people voted for State-wide prohibition on May 26, 1908. The law became effective on Jan. 1, 1909. Bryan carried the State in 1908, receiving 136,928 votes, while Taft received 114,887. The Democrats elected W. W. Kitchin Governor. The Legislature in January, 1909, elected Lee S. Overman United States Senator. In the presidential election of 1912 Wilson received 144,507 votes, Roosevelt, 69,130 and Taft 29,139. Locke Craig, Democrat, was elected Governor. Furnifold M. Simmons received the majority primary vote for United States Senator, and was elected by the Legislature in January, 1913. On Nov. 3, 1914, Senator Overman was reëlected. The Legislature of 1915 passed a primary-election law providing for the nomination of all officials by primaries. The State has 10 representatives in Congress.

The governors of the Colony and State have been as follows:

UNDER THE LORDS PROPRIETORS

William Drummond	1663–67
Samuel Stephens	1667–70
Peter Carteret	1670
Samuel Stephens	1670–74
John Jenkins (acting)	1675
John Harvey (acting)	1675–76
Thomas Eastchurch	1676–77
Thomas Miller (acting)	1677–78
John Harvey (acting)	1678
John Jenkins	1678–81
Henry Wilkinson	1681–83
Seth Southwell (or Sothel)	1683–89
Philip Ludwell	1689–91
Alexander Lillington	1691–94
Thomas Harvey	1694–99
Henderson Walker	1699–1704
Robert Daniel	1704–05
Thomas Cary	1705–06
William Glover (acting)	1706–07
Thomas Cary (acting)	1707–08
William Glover Thomas Cary } contestants	1708–10
Edward Hyde	1710–12
Thomas Pollock (acting)	1713–14
Charles Eden	1714–22
Thomas Pollock (acting)	1722
William Reed (acting)	1722–24
George Burrington	1724–25
Edward Mosely (acting)	1725
Sir Richard Everard	1725–29

ROYAL

George Burrington	1729–34
Nathaniel Rice (acting)	1734
Gabriel Johnston	1734–52
Nathaniel Rice (acting)	1752
Matthew Rowan (acting)	1752–54
Arthur Dobbs	1754–65
William Tryon	1765–71
James Hasell (acting)	1771
Josiah Martin	1771–75

GOVERNORS OF THE STATE

Richard Caswell		1777–79
Abner Nash		1779–81
Thomas Burke		1781–82
Alexander Martin		1782–84
Richard Caswell		1784–87
Samuel Johnston	Federalist	1787–89
Alexander Martin	"	1789–92
Richard Dobbs Spaight	Democratic Republican	1792–95
Samuel Ashe	" "	1795–98
Wm. Richardson Davie	" "	1798–99
Benjamin Williams	" "	1799–1802
James Turner	" "	1802–05
Nathaniel Alexander	" "	1805–07
Benjamin Williams	" "	1807–08
David Stone	" "	1808–10
Benjamin Smith	" "	1810–11
William Hawkins	" "	1811–14
William Miller	" "	1814–17
John Branch	" "	1817–20
Jesse Franklin	" "	1820–21
Gabriel Holmes	" "	1821–24
Hutchings G. Burton	" "	1824–27
James Iredell	Democrat	1827–28
John Owen	"	1828–30
Montford Stokes	"	1830–32
David L. Swain	"	1832–35
Richard Dobbs Spaight, Jr.	"	1835–37
Edward B. Dudley	Whig	1837–41
John M. Morehead	"	1841–45
William A. Graham	"	1845–49
Charles Manly	"	1849–51
David S. Reid	Democrat	1851–54
Warren Winslow (acting)		1854–55
Thomas Bragg	Democrat	1855–59
John W. Ellis	"	1859–61
H. T. Clark (acting)		1861–62
Zebulon B. Vance		1862–65
W. W. Holden (provisional)		1865
Jonathan Worth	Conservative	1865–67
Gen. Daniel E. Sickles (military)		1867
Gen. E. R. S. Canby	"	1867–68
W. W. Holden	Republican (impeached)	1868–70
Tod R. Caldwell	"	1870–74
Curtis H. Brogden	"	1874–77
Zebulon B. Vance	Democrat	1877–78
Thomas J. Jarvis	"	1878–85
Alfred M. Scoles	"	1885–89
Daniel G. Fowle	"	1889–91
Thomas M. Holt	"	1891–93
Elias Carr	"	1893–97
Daniel L. Russell	Republican	1897–1901
Charles B. Aycock	Democrat	1901–05
Robert B. Glenn	"	1905–09
W. W. Kitchin	"	1909–13
Locke Craig	"	1913–

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NORTH CAROLINA, UNIVERSITY OF. A State institution for higher education located at Chapel Hill, N. C. It was chartered in 1789 and was opened in 1795. The university comprises a college, graduate school, schools of law, mining, pharmacy, and engineering. It confers the bachelor's degree in arts, sciences, and law, the degree of graduate in pharmacy, the master's degree in arts and sciences, and the doctor's degree in philosophy. Free instruction is offered to graduates of colleges and universities, to candidates for the ministry, to teachers and young men who are preparing to teach, and to those who are laboring under bodily infirmities. The loan fund furnishes temporary assistance to indigent students. Women are admitted to the higher courses. The total enrollment in all departments of the university in 1914–15 was 1017, of whom 50 were graduate students, 687 college undergraduates, 135 law students, 81 medical students, 58 pharmacal students, and 77 in the summer school. The faculty numbered 85. The college campus covers 48 acres and with the buildings, 25 in number, is valued at $1,137,500. The productive funds amount to about $185,000 and the income is about $170,000. The library contains about 70,000 volumes. The president is E. K. Graham, LL.D., who in 1914 succeeded F. B. Benuble.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS. A State institution for agricultural and scientific education established in 1887 at West Raleigh. It includes schools of agriculture, chemistry, civil engineering, electrical engineering, mechanical engineering, a textile school, a veterinary school, and a summer term in agriculture. There is an agricultural experiment station connected with the college, which also coöperates with the State Department of Agriculture. The college is entirely technical and offers no general courses of study. English, mathematics, modern languages, and the sciences are taught in all courses. Extension courses in agriculture covering all phases of the science are carried on. The college is supported by appropriations from the State and by the United States government. The grounds, including the farm, are valued at $108,310, while the buildings and equipment are valued at about $850,000. The total enrollment in 1915 was 702, and the faculty numbered 62 members. The library contains about 10,000 volumes. The president in 1915 was Daniel Harvey Hill, LL.D.

NORTH CHICAGO. A city in Lake Co., Ill., 35 miles from Chicago, on Lake Michigan and on the Chicago and Northwestern and the Elgin, Joliet, and Eastern railroads (Map: Illinois, J 1). It contains a United States naval training station and has manufactories of wire fencing and gates, springs, builders' hardware, brass and iron castings, envelopes, cards, portable elevators, milk machinery, etc. Pop., 1900, 1150; 1910, 3306.

NORTHCLIFFE, ALFRED CHARLES HARMSWORTH, first BARON (1865–). A British newspaper proprietor, brother of Harold Sidney Harmsworth (Baron Rothermere) and of Hildebrand Harmsworth (qq.v.). He was born at Chapelizod, County Dublin, Ireland, his father being a barrister. The son early took up journalism in London, and in a short time had made a success of *Answers*, a weekly journal that he founded in 1888; then of the moribund London *Evening News* (which he acquired in 1894); of the London *Daily Mail* (founded 1896), a halfpenny paper, which through a very popular appeal gained an immense circulation; of *Harmsworth's Magazine* (founded 1898); and of other papers and magazines. Harmsworth was created Baronet in 1904 and in 1905 was raised to the peerage as Baron Northcliffe. He achieved what was perhaps his highest ambition in 1908, when he secured control of the London *Times*. His other interests were all subsidiary to his business undertakings. He equipped the Jackson-Harmsworth Arctic expedition in 1894, became active in motoring affairs, and was responsible for the offering by the *Mail* of a $50,000 aviation prize. While visiting the United States in 1900 Lord Northcliffe brought out a special issue of a New York daily in 32-page, quarto, magazine form, to illustrate his theory of the newspaper of the future. He himself, however, had taken a leaf from the history of American journalism. Although no one had done more to revolutionize the character of British newspapers, not only in the field of news writing but in editorial freedom, Northcliffe received the most violent censure on all sides for his attack on Earl Kitchener in May, 1915. The military correspondent of the *Times* had made a statement, which passed the censorship under which Northcliffe had chafed unceasingly, that for General French's lack of enough high-explosive shells Kitchener, Secretary of State for War, was responsible. Northcliffe followed up this supposed revelation by a series of editorials in the *Mail*. Shortly afterward the cabinet was reorganized to include eight Unionists, and, while Kitchener was retained as Secretary of State for War, a new office, that of Minister of Munitions, was created and David Lloyd-George appointed to it. In July Northcliffe opened fire upon what he alleged was an organized effort to bring back to the cabinet Viscount Haldane, whose attitude on the war, generally considered unpatriotic, had cost him the lord-chancellorship. Consult A. G. Gardiner, *Prophets, Priests, and Kings* (London, 1908; new ed., "Wayfarer's Library," ib., 1914). See NEWSPAPER, *England*.

NORTH CONWAY. A village of New Hampshire. See CONWAY.

NORTHCOTE, nôrth'kŏt, HENRY STAFFORD, first BARON (1846–1911). An English administrator. He was educated at Eton and at Merton College, Oxford, and became a clerk in the Foreign Office of the British government. He accompanied his father, Sir Stafford Henry Northcote (q.v.), to the United States in 1871 and visited Canada in 1873. In 1876 he went with Lord Salisbury on a mission to bring about the pacification of the Turkish provinces. From 1880 to 1899 he was a Conservative member of Parliament for Exeter. While Governor of Bombay from 1899 to 1903 he was especially active in alleviating the effects of several Indian famines that occurred during his administration. From 1904 to 1909 he served as Governor-General of Australia. His popularity with all parties in this commonwealth was a material factor in bringing about a greater degree of Imperial unity. He was created Baronet in 1887, was elevated to the peerage, and took his seat in the House of Lords in 1909.

NORTHCOTE, JAMES (1746–1831). An English historical and portrait painter and author, born at Plymouth. He was assistant to Sir Joshua Reynolds; studied also at the Royal Academy schools; went to Italy in 1777, remaining there three years, and on his return was employed by Boydell, the publisher, to paint nine pictures for the famous Shakespeare Gallery, the most important of which is "The Murder of the Princes in the Tower" (Petworth). Among his other historical compositions are "Death of Wat Tyler in 1381" (1786), now in the Guildhall, London, and the "Presentation of British Officers to Pope Pius VI," in the South Kensington Museum. Northcote also obtained considerable success with pictures of animals, but he is known chiefly for his portraits, which are well drawn and modeled and reveal the influence of Opie, Romney, and Reynolds. The South Kensington Museum contains three, and five are in the National Portrait Gallery, including those of Dr. Jenner, of Viscount Exmouth, and of himself (1827). He was appointed a Royal Academician in 1787. His literary ability is proved by his *Memoirs of Sir Joshua Reynolds* (1813), to which a supplement was added in 1815, and by his *Life of Titian* (1830). Consult S. Gwynn, *Memorials of an XVIIIth Century Painter* (London, 1898), and Fletcher, *Conversations of James Northcote with James Ward* (ib., 1901).

NORTHCOTE, SIR STAFFORD HENRY, first EARL OF IDDESLEIGH (1818–87). An English statesman and financier, born in London, Oct. 27, 1818. He was educated at Eton and Oxford, graduating at Balliol College in 1839 with high honors. His first position in political life was that of private secretary to Gladstone when the latter was President of the Board of Trade. In 1847 he was called to the bar at the Inner Temple and was made legal secretary to the Board of Trade. In 1851 he succeeded to the family title and estates as eighth Baronet of his line. He was member of Parliament for Dudley in 1855, for Stamford in 1858–66, and for North Devon from 1866 until his elevation to the peerage. He was President of the Board of Trade in 1866–67, and Secretary of State for India in 1867–68. From 1869 to 1874 he was chairman of the Hudson's Bay Company, and promoted the transfer of Prince Rupert's Land to the Canadian government. He visited Canada and the United States in 1870 to study conditions, and was a member of the joint high commission which signed the Treaty of Washington on May 8, 1871. On the formation of Disraeli's cabinet in 1874, Sir Stafford Northcote was made Chancellor of the Exchequer, and when his leader was elevated to the peerage under the title of Lord Beaconsfield, Northcote became leader of the Commons. In the first Salisbury administration (1885–86) he was First Lord of the Treasury. He was created Earl of Iddesleigh and Viscount St. Cyres in 1885. When Salisbury became Premier for the second time (1886) the Earl of Iddesleigh was made Foreign Secretary. He died suddenly on Jan. 12, 1887, in the presence of Lord Salisbury, the Premier, in the official residence, London. Northcote published a number of political and financial pamphlets, such as *Twenty Years of Financial Policy* (London, 1862). His son became first Baron Northcote (q.v.). Consult his collected *Lectures and Essays* (London, 1887); Andrew Lang, *Life, Letters, and Diaries of Stafford Northcote, First Earl of Iddesleigh* (id., 1890); Bryce, *Studies in Contemporary Biography* (New York, 1903).

NORTH DAKO'TA. A North Central State of the United States, lying between lat. 45° 55′ and 49° N. and long. 96° 25′ and 104° 3′ W. It is bounded on the north by the Canadian provinces of Saskatchewan and Manitoba, on the east by Minnesota, on the south by South Dakota, and on the west by Montana. Its boundaries are straight lines, except the east border, which is formed by the Red River of the North. Its shape is that of a rectangle, with an extreme length east and west of 360 miles and a breadth of 210 miles. The area is 70,837 square miles, of which 70,183 cover the land surface. North Dakota is fourteenth in size among the States.

Topography. The surface is formed of three plains rising one above the other. The lowest is the broad Red River valley with an elevation of from 800 to 1000 feet. This is bordered on the west by a higher plain rising from 1200 to 1600 feet above sea level, while still farther west and occupying nearly one-half the State is the plateau of the Missouri with an elevation of from 1800 to 2800 feet. The relief ranges from 789 feet in the extreme northeast corner to 3468 feet on Black Butte in the southwest corner. The remarkably level plain of the Red River valley, formerly the bed of glacial Lake Agassiz, extends from 30 to 40 miles west of the river, where it is bounded in its northern portion by an escarpment and farther south by a more gradual slope leading up to the higher plain. The Pembina Mountains is the name applied to the wooded escarpment in North Dakota. The second or drift plain varies in width from 75 miles at the south to over 200 miles near the Canadian boundary, and is bordered on the west by a second abrupt slope rising to the level of the Missouri plateau. Three kinds of topography, differing widely in origin, are represented: (1) the glacial drift, (2) lacustrine plains, and (3) erosion topography. West and south of the Missouri River, where the drift is either absent or so thin as not to affect the topography except locally, the surface features are due chiefly to erosion. Hundreds of feet of strata have been removed, leaving the numerous buttes so characteristic of this region, while along many streams rough "bad lands" have been cut in the soft clays and sandstones. This region is well drained by the Little Missouri, Knife, Heart, and Cannon Ball rivers, all tributaries of the Missouri. These streams have cut valleys 200 to 500 feet deep and 1 or 2 miles wide. In Lake Agassiz and in Lake Souris in north-central North Dakota, fine silt was deposited to form the level and fertile lacustrine plains of the Red River valley and the Mouse River area. The glacial drift has determined the topography over nearly two-thirds of the State, including not only the drift plain itself but also that part of the Missouri plateau north and east of the Missouri River. The surface is for the most part gently rolling, in places rough, and the treeless prairie is dotted with many lakes, of which Devil's Lake is the largest. The James, Sheyenne, and Mouse rivers are the only streams of importance in this large drift-covered area. The Turtle Mountains, which have been separated by erosion from the Missouri plateau, form a small, rough plateau area rising 500 feet above the drift plain and extending 14 miles south of the Canadian boundary.

Climate and Soil. The climate of North Dakota is marked by long winters and by summers which as a rule are cool and delightful. In spite of its severity the dryness of the atmosphere renders it healthful and invigorating. The annual mean temperature for the entire State is 39° F. During the winter months the mean ranges from 5.2° F. to 12.9° F., and in summer it ranges from 63.1° F. to 67.6° F. The maximum recorded is 110° F., the minimum is —54° F. The average annual precipitation is a little over 18 inches. The heaviest annual precipitation, about 20 inches, occurs in the Red River valley, and the least, about 14 inches, in the western part of the State. The heaviest rainfall comes during May, June, July, and August, 11 inches, or 61 per cent of the total annual precipitation, coming during these months. High winds are frequent, but as they cross the State mostly in winter and spring, they have little effect on vegetation and are rarely destructive. The snowfall during the winter is generally light. The fertile black loams of the Red River valley, especially favorable to wheat growing, are formed of lake and river silts; the drift soils are composed of materials gathered and transported by the ice sheet, while residual soils, due to rock weathering in situ, are found in the southwest corner of the State.

Geology. The rock formations of the State belong to the Cretaceous, Tertiary, and Quaternary periods. The deposits of the latter period include the Lake Agassiz silt of the Red River valley and the drift deposits which cover the stratified rocks over most of the State. The Cretaceous formations, composed mostly of shale, crop out in the eastern portion, and the Tertiary clays, shales, and sandstones in the western portion. The Dakota sandstone at the base of the Cretaceous is the source of artesian water. Extensive and numerous beds of lignite are found in the Tertiary strata, which also contain large deposits of high-grade clays suitable for fire brick, pottery, and many other products.

Mining. North Dakota has little importance as a producer of minerals. Three-fourths of the output of the mines in 1913 was lignite coal, and most of the remainder clay products. The area underlain by lignite is larger than the total coal area of any other State except Illinois and Montana. The beds are for the most part thin and of little value, but furnish considerable fuel for local use. The coal has proved of great value to the settlers on the large areas which are mainly treeless. The most important coal-mining centres are near Hayne in Adams County and near Leith in Morton County. In 1913 the coal production amounted to 495,320 short tons, valued at $750,652. The value of the clay products, principally common brick, in 1913 was $262,580. Aside from the lignite and the clay production the only mineral substances produced in North Dakota are natural gas, sand and gravel, sand-lime brick, and some commercial mineral waters. The total value of the mineral products in 1913 was $1,055,676.

Agriculture. Of an approximate land area of 44,917,120 acres 28,426,650 acres was in farms in 1910, the improved land in which amounted to 20,455,092 acres. The total number of farms was 74,360. The total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, in 1910 was $974,814,205. Over 97 per cent of the farms had 100 acres or more each.

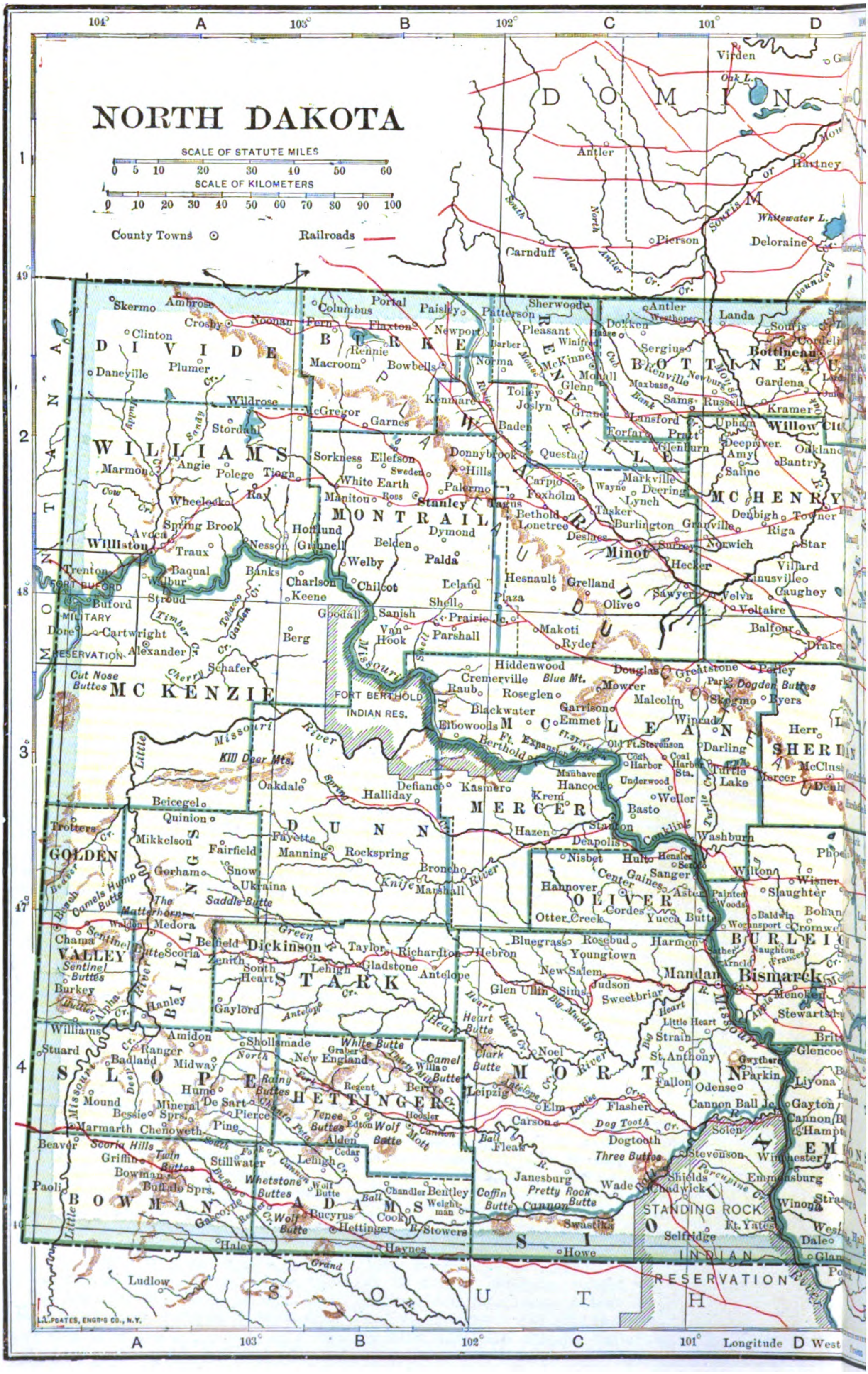
Of the total number of farms in 1910, 63,696 were operated by owners and managers and 10,664 by tenants. The native white farmers numbered 35,750 and the foreign-born white farmers 37,867. The negro and other nonwhite farmers numbered 743. It will be noted that the foreign-born white farmers exceeded in number the native white farmers. Of the foreign-born white farmers 10,886 were born in Norway, 7734 in Russia, 4825 in Germany, 4251 in Canada, and 3635 in Sweden.

The acreage, value, and production of important crops as estimated for 1914 by the United States Department of Agriculture are shown in the following table:

CROPS	Acreage	Prod. in bu.	Value
Corn	500,000	14,000,000	$8,120,000
Wheat	7,285,000	81,592,000	82,408,000
Oats	2,318,000	64,904,000	24,014,000
Barley	1,450,000	28,275,000	12,724,000
Rye	131,000	2,240,000	1,882,000
Potatoes	70,000	7,630,000	3,205,000
Hay	400,000	*580,000	3,016,000
Flaxseed	840,000	6,972,000	8,924,000

* Tons.

The total value of crops in 1909 was $180,636,000 and the combined acreage was $15,888,756. Judged by value the leading crops are wheat, oats, flaxseed, hay and forage, barley, corn, and potatoes in the order of their importance. Wheat is by far the most important and represents both an acreage and a value more than two-thirds those of all cereals combined. In 1910, 8,188,782 acres were devoted to this crop and there were produced 116,781,886 bushels, valued at $109,129,869. Oats ranks second in value, though exceeded by hay and forage in acreage. This had an acreage of 2,147,032 in 1910 and a production of 65,886,702 bushels, valued at $24,114,345. Flaxseed had an acreage of 1,068,049 and a production of 10,245,684 bushels, of $15,448,016 value. The acreage of hay and forage was 2,864,218 and the production amounted to 3,010,401 tons, which were valued at $12,368,014. Next to this ranks barley with an acreage of 1,215,811 and a production of 26,365,758 bushels, valued at $11,962,036. Corn, grown to a larger extent in the southeast, had an acreage of 185,122, there being produced, in 1910, 4,941,152 bushels, valued at $2,403,303.


NORTH DAKOTA
SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
County Towns
Railroads
104° A 103° B 102° C 101° D
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3
4
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48
47
46
DOMINION
MONTANA
SOUTH
DIVIDE
BURKE
WILLIAMS
MOUNTRAIL
WARD
RENVILLE
BOTTINEAU
McHENRY
McKENZIE
McLEAN
SHERIDAN
MERCER
DUNN
OLIVER
GOLDEN VALLEY
BILLINGS
STARK
MORTON
BURLEIGH
EMMONS
SLOPE
HETTINGER
BOWMAN
ADAMS
SIOUX
FORT BUFORD MILITARY RESERVATION
FORT BERTHOLD INDIAN RES.
STANDING ROCK INDIAN RESERVATION
Missouri River
Souris or Mouse R.
Little Missouri R.
Knife River
Heart R.
Cannon Ball R.
Grand R.
Kill Deer Mts.
Williston
Minot
Stanley
Dickinson
Mandan
Bismarck
L.L.POATES, ENGR'G CO., N.Y.
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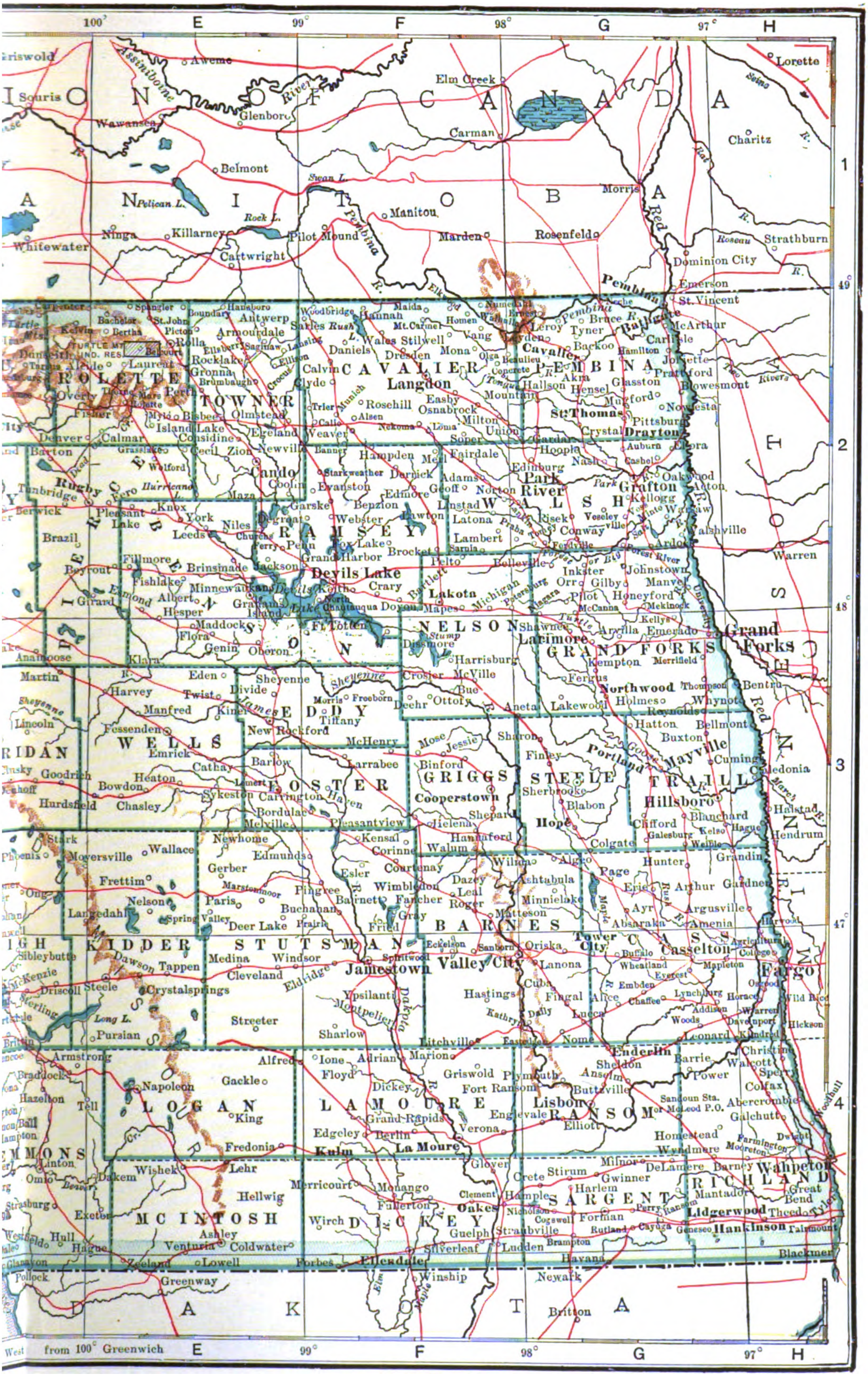
100°
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Wawanesa
Glenboro
Elm Creek
Carman
Lorette
Seine
Charitz
R.
Rat
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Belmont
Swan L.
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Manitou
Morris
Red
Rock L.
Ninga
Killarney
Pilot Mound
Marden
Rosenfeld
Roseau
Strathburn
Whitewater
Cartwright
Pembina
Dominion City
Emerson
St. Vincent
49°
Pembina
Bathgate
McArthur
Carlisle
Spangler
St. John
Bottineau
Antwerp
Armourdale
Rolla
Woodbridge
Hannah
Sarles
Mt. Carmel
Walhalla
Leroy
Tyner
Bruce
Backoo
Hamilton
Joliette
Drayton
Kelvin
Bertha
Turtle Mt. Ind. Res.
Belcourt
Laurel
Rocklake
Ellison
Lansing
Calvin
Daniels
Wales
Stillwell
Dresden
Mona
Vang
Olga
Cavalier
Pembina
Langdon
Hallson
Akra
Hensel
Glasston
Prattford
Blowesmont
Two Rivers
Rolette
Towner
Gronna
Brumbaugh
Perth
Clyde
Munich
Rosehill
Easby
Osnabrock
Mountain
St. Thomas
Mugford
Nowesta
Overly
Fisher
Olmstead
Bisbee
Island Lake
Considine
Egeland
Trier
Calio
Alsen
Nekoma
Loma
Milton
Union
Crystal
Pittsburg
Denver
Calmar
Cecil
Zion
Newville
Banner
Soper
Gardar
Hoople
Auburn
Cashel
Elora
2
Barton
Grasslake
Wolford
Cando
Hampden
Fairdale
Edinburg
Nash
Park River
Grafton
Oakwood
Acton
Rugby
Hurricane
Starkweather
Adams
Norton
Kellogg
Walsh
Minto
Warsaw
Tunbridge
Knox
Maza
Coolin
Evanston
Edmore
Garske
Benzion
Lankin
Latona
Lambert
Fordville
Conway
Veseleyville
Forest River
Ardoch
Walshville
Warren
Berwick
Pleasant Lake
York
Leeds
Niles
Churchs Ferry
Pierce
Brazil
Webster
Ramsey
Fox Lake
Brocket
Lawton
Grand Harbor
Pelto
Belleville
Inkster
Johnstown
Fillmore
Brinsmade
Devils Lake
Crary
Orr
Gilby
Manvel
Benson
Fishlake
Minnewaukan
Grahams Island
Lakota
Michigan
Petersburg
Niagara
Pilot
Honeyford
Meckinock
Girard
Esmond
Albert
Hesper
Maddock
North Chautauqua
Doyon
Mapes
McCanna
Kellys
Grand Forks
Flora
Ft. Totten
Nelson
Shawnee
Larimore
Arvilla
Emerado
48°
Anamoose
Klara
Genin
Oberon
Stump Lake
Dishmore
Harrisburg
Grand Forks
Kempton
Merrifield
Martin
Eden
Sheyenne
Crosier
McVille
Fergus
Northwood
Thompson
Bentru
Harvey
Twist
Divide
Morris
Freeborn
Bue
Holmes
Whynot
Sheyenne
Lincoln
Manfred
Kiner
James
Eddy
Deehr
Ottofy
Aneta
Lakewood
Reynolds
Red
Fessenden
Tiffany
New Rockford
McHenry
Hatton
Bellmont
Buxton
Sheridan
Wells
Emrick
Mose
Jessie
Sharon
Finley
Portland
Mayville
Cuming
Caledonia
3
Goodrich
Heaton
Cathay
Barlow
Larrabee
Binford
Goose
Bowdon
Sykeston
Foster
Carrington
Griggs
Steele
Traill
Marsh
Halstad
Hurdsfield
Chaseley
Bordulac
Haven
Cooperstown
Sherbrooke
Hillsboro
Blanchard
Melville
Pleasantview
Helena
Shepard
Blabon
Hope
Clifford
Galesburg
Kelso
Hague
Hendrum
Stark
Newhome
Kensal
Hannaford
Colgate
Wallace
Moyersville
Edmunds
Corinne
Walum
Wilmo
Alga
Hunter
Grandin
Phoenis
Gerber
Courtenay
Page
Frettim
Marstonmoor
Pingree
Wimbledon
Dazey
Ashtabula
Erie
Arthur
Gardner
Nelson
Paris
Barnett
Fancher
Leal
Roger
Minnielake
Ayr
Argusville
Langedahl
Spring Valley
Buchanan
Gray
Maple
Rush
Absaraka
Amenia
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Deer Lake
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Stutsman
Eckelson
Sanborn
Oriska
Tower City
Cass
Casselton
Agricultural College
Sibley butte
Medina
Windsor
Spiritwood
Valley City
Lanona
Buffalo
Wheatland
Mapleton
Fargo
Dawson
Tappen
Cleveland
Jamestown
Everest
McKenzie
Eldridge
Cuba
Embden
Osgood
Driscoll
Steele
Crystalsprings
Ypsilanti
Hastings
Fingal
Alice
Chaffee
Lynchburg
Horace
Wild Rice
Sterling
Montpelier
Dakota
Kathryn
Daily
Lucca
Addison
Warren
Long L.
Streeter
Woods
Davenport
Hickson
Purian
Sharlow
Litchville
Fasetka
Nome
Leonard
Kindred
Armstrong
Alfred
Ione
Adrian
Marion
Enderlin
Barrie
Christine
Walcott
Braddock
Gackle
Floyd
Sheldon
Power
Sperry
Napoleon
Griswold
Plymouth
Ansel
Colfax
Hazelton
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Dickey
Fort Ransom
Lisbon
Buttzville
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Grand Rapids
Englevale
Ransom
Elliott
Galchutt
Woodbull
Edgeley
Berlin
Verona
Homestead
Farmington
Dwight
Emmons
Fredonia
Kulm
La Moure
Wyndmere
Mooreton
Linton
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Glover
Crete
Stirum
Milnor
DeLamere
Barney
Wahpeton
Omio
Beaver
Dakem
Wishek
Merricourt
Monango
Gwinner
Harlem
Richland
Mantador
Great Bend
Hellwig
Clement
Hample
Strasburg
Exeter
McIntosh
Fullerton
Oakes
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Perry
Ransom
Lidgerwood
Theed
Westfield
Hull
Hague
Ashley
Wirch
Dickey
Nicholson
Cogswell
Forman
Rutland
Cayuga
Geneseo
Hankinson
Fairmount
Venturia
Coldwater
Guelph
Straubville
Brampton
Silverleaf
Ludden
Havana
Blackmer
Glanavon
Zeeland
Lowell
Forbes
Ellendale
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In 1909 the total acreage of potatoes and other vegetables was 67,450 and their value $3,148,304. Excluding potatoes and sweet potatoes and yams, the acreage of vegetables was 13,383 and their value $1,069,000. The orchard fruits produced are insignificant in quantity and value, as is also production of small fruits.

Live Stock and Dairy Products. North Dakota is one of the most important of the cattle-raising States. Conditions, however, are changing as in other Western States, and the open range controlled by a few ranches has to a large extent disappeared, and now large areas formerly given over to cattle raising are under control of numerous homesteaders. The prairie lands afford excellent pasturage, and large areas of wild salt and prairie grasses are annually cut for winter feed. The total value of live stock on farms in 1910 was $106,761,317. On Jan. 1, 1915, the estimated number of cattle other than milch cows was 515,000, valued at $18,540,000; milch cows numbered 339,000, valued at $20,848,000; horses, 785,000, valued at $86,350,000; mules, 8000, valued at $976,000; sheep, 250,000, valued at $1,125,000; swine, 642,000, valued at $7,576,000. The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $4,872,304. The milk sold amounted to 1,644,150 gallons, valued at $293,956, and the butter made to 16,414,439 pounds, valued at $3,508,579. The total number of fowls on the farms in 1910 was 3,268,109, estimated at $1,485,463.

Manufactures. Although North Dakota is primarily an agricultural community, the total value of the manufactured products is steadily increasing. In 1909 North Dakota ranked forty-fifth among the States of the Union in value of manufactures. The gross value of manufactured products per capita was $33 in that year. The following table gives the most important figures relating to manufactures for 1909 and 1904.

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Salaries	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands				
All industries	1909	752	4,148	2,789	$11,585	$629	$1,787	$19,138	$5,464
	1904	507	2,545	1,755	5,704	258	1,031	10,218	3,122
Bread and other bakery products.	1909	67	242	146	337	17	84	601	255
	1904	39	137	86	107	6	44	311	127
Brick and tile	1909	13	214	188	769	25	88	287	214
	1904	14	142	117	204	10	60	170	136
Butter, cheese, and condensed milk.	1909	68	106	62	312	8	46	1,029	138
	1904	60	98	55	202	2	38	562	84
Cars and general shop construction and repairs by steam-railroad companies.	1909	5	494	463	745	33	340	680	380
	1904	3	166	146	137	19	102	202	121
Flour-mill and gristmill products.	1909	84	710	435	4,427	199	283	11,685	1,630
	1904	56	454	312	2,384	85	200	6,463	1,000
Gas, illuminating and heating	1909	6	49	28	861	18	13	199	121
	1904	4	23	10	432	11	6	102	68
Printing and publishing	1909	330	1,294	788	1,955	154	533	1,910	1,470
	1904	229	834	515	1,079	69	313	1,110	873
Tobacco manufactures	1909	28	68	34	53	1	20	98	61
	1904	27	60	30	35	....	16	76	47
All other industries	1909	151	971	645	2,126	174	380	2,649	1,195
	1904	75	631	484	1,124	56	252	1,222	666

The most important industries are those related to the manufacture of flour-mill and gristmill products. Most important of these commodities is wheat flour, of which there were produced, in 1909, 1,825,920 barrels, chiefly white flour, valued at $9,034,418. Next in importance is offal, of which there were produced 76,357 tons, valued at $1,554,283. Other products of importance are feed, grits, corn meal, and rye flour. The printing and publishing industry was second in point of value of products, and the manufacture of butter, cheese, and condensed milk third. There is practically no lumber industry, owing to the absence of forests.

The total number of wage earners in the manufacturing industries in 1909 was 2789, of whom 2538 were males. The wage earners under 16 years of age numbered 57, of whom all but 8 were males. Almost one-half of the total number of wage earners were in establishments where the prevailing hours of labor were 60 a week, or 10 a day. There were only two cities with a population of 10,000 or over. These were Fargo and Grand Forks. These cities, with less than one-third of the wage earners, produced nearly one-fourth of the value of the manufactured products. In Fargo the manufacture of saddlery and harness and the printing and publishing industry predominate. In Grand Forks the flour-mill and gristmill and printing and publishing industries are the most important.

Transportation. Two roads, the Great Northern and the Northern Pacific, traverse the State from east to west, and numerous lines, branches, and spurs afford the eastern and northern portions excellent transportation facilities. The chief roads and their mileage of main line are: the Great Northern, 427; the Northern Pacific, 378; the Minneapolis, St. Paul, and Sault Ste. Marie, 361; the Chicago, Milwaukee, and St. Paul, 103. The total mileage of main and branch track in 1914 was 6184.

Banking. Until the organization of the State there was very little banking within its confines. In 1873 the first private bank commenced operations. The first incorporated bank opened in 1878 as a national bank. At the time of admission to statehood there were 30 national and 8 State banks. One of the first measures of the Legislature in 1890 was to pass a stringent banking law prohibiting private banking, creating the office of Superintendent of Banks, and providing for reports and examinations. Under the security of this law many State banks were organized and the number of national banks diminished somewhat. In 1892–93 the reputation of the North Dakota banks was seriously injured by the long list of failures of the so-called Mears banks, organized by E. Mears according to the Territorial law and therefore not amenable to the new regulations. The last of these banks went into liquidation in 1896 and the reputation of the banks of the State was restored. The condition of the banks in 1914 is shown in the following table:

1914	National banks	State banks	Loan and trust companies
Number	149	627	4
Capital	$5,500,000	$8,383,000	$360,000
Surplus	2,247,350	2,493,000	90,000
Cash, etc.	2,675,444	1,893,000	23,000
Deposits	37,271,801	48,067,000	529,000
Loans	34,503,003	46,991,000	769,000

Government. The State constitution was adopted in 1889. An amendment may originate in either branch of the Legislature or among the people, but to become effective must be adopted by the majority of the members of two successive Legislatures and finally by the majority of the electors.

Legislative.—The Legislature, consisting of the Senate and House of Representatives, meets biennially for regular sessions not exceeding 60 days each. The Senate is composed of not less than 30 and not more than 50 members elected for a term of four years. The House of Representatives is composed of not less than 60 and not more than 140 members elected for two years. The initiative and referendum have been adopted and are in full force.

Executive.—The executive power is vested in a Governor, Lieutenant Governor, Secretary of State, Auditor, Treasurer, Superintendent of Public Instruction, Commissioner of Insurance, three Railroad Commissioners, an Attorney-General, and a Commissioner of Agriculture and Labor. Each holds office for two years. The Governor and Lieutenant Governor must be at least 30 years of age and must have resided in the State for five years. The Governor has power to disapprove of any item or items of appropriation bills and to remove any county or municipal officer for misconduct, malfeasance, crime in office, habitual drunkenness, or gross incompetency.

Judicial.—The judicial power is vested in the supreme court, district court, probate or county courts, justices of the peace, and such other courts as may be created by law. The supreme court has appellate jurisdiction only and has general superintending control over all inferior courts. It consists of five judges who are elected for six years. The State is divided into 12 judicial districts, each of which is presided over by a district judge. In each county a judge, chosen by the electors of the county for two years, holds county or probate court, which is a court of record.

Suffrage and Elections.—Every male citizen of the United States 21 years of age or over who has resided in the State one year, in the county six months, and in the precinct 90 days is entitled to vote. Civilized Indians who have severed their tribal relations two years preceding the election are admitted to the electorate on the same terms as the whites. General elections are biennial and are held on the Tuesday after the first Monday in November. Women who have the proper qualifications may vote for all school officers and upon all questions pertaining to school matters. They are also eligible to any school office. There is a primary-election law under which all candidates for office are nominated. Nominations are made by petition. Provision is made for preference vote for President and Vice President. Provision is made for the nonpartisan nomination and election of judges of the supreme and district courts and for State Superintendent of Public Instruction and county superintendents of schools. There is a Corrupt Practices Act providing severe penalties for bribery and other crimes against the electorate. An absent voters act permits voters who are absent from their election districts on the day of election to forward their ballots by mail.

Local and Municipal Government.—The State is divided into counties for administrative purposes. County affairs are administered by a board of commissioners elected every two years from commissioner districts. For each county there are elected a county or probate judge, auditor, register of deeds, treasurer, sheriff, and State's attorney. Any city or village of 500 inhabitants or more may adopt a commission form of government, and voters in cities who have adopted this form may exercise the right of initiative, referendum, and recall. Any city after six years under the commission form of government may return to the older council form of government for cities of its class or to its previous charter. All city and village elections have nonpartisan nomination by petition.

Miscellaneous Constitutional and Statutory Provisions.—There is a pure-food law conforming in its essential provisions to the national law. Pure-advertising, pure-drug, pure-paint, pure-seed, and pure-fertilizer laws are also in force. Discriminations on the part of corporations are forbidden and provision is made for the forfeiture of the charter of any corporation which breaks this law. The maximum passenger rate of two and one-half cents a mile is prescribed to the railroads. North Dakota is one of the few States in which prohibition of the sale or manufacture of intoxicating liquors is constitutional. Under the law no one is permitted to sell intoxicating liquors even for medicinal purposes.

Finances. The public debt was created mainly in 1884–89, before North Dakota's admission to statehood, for purposes of construction of public buildings. It bore 6 per cent, but was refunded after 1890 in 4 per cent bonds. At the time of admission the debt was $689,000, and the constitution prohibits any increase of this debt by more than $200,000. The income of the State is derived from a general property tax limited by the constitution to four mills, from a tax on corporations and railroads, and from sale of public lands. All the proceeds from the last source must go into the permanent school fund.

On June 30, 1914, the State had a balance on hand in the treasury of $1,633,417. The total receipts for the fiscal year preceding were $5,387,226 and the expenditures for the same period amounted to $5,737,485. The bonded indebtedness in 1914 was $937,300 and the assessed valuation of real property and improvements subject to taxation, $199,370,000.

Militia. The males of militia age in the State in 1910 numbered 145,628. The organized militia on Dec. 31, 1913, comprised 679 enlisted men and 60 officers. It included two regiments of infantry and one detachment of sanitary troops.

Population. In population North Dakota ranked thirty-seventh among the States of the Union in 1910. The population taken by decades of that part of the Dakota territory that was in 1889 admitted as the State of North Dakota is as follows: 1870, 2405; 1880, 36,906; 1890, 190,983; 1900, 319,146; 1910, 577,056. The estimated population for 1915 numbered 713,083. The population per square mile in 1910 was 8.2; the urban population, i.e., that in places of 2500 or more, 63,236; the rural, 513,820. The native whites numbered 413,697, the foreign-born whites 156,158, Indians 6468, and negroes 617. Of the foreign-born 29.4 per cent came from Norway, 20.4 from Russia, 13.5 from Canada, and 10.6 from Germany. Of the native-born population 47.1 per cent was born in the State. Of those born in other States Minnesota furnished 16.4 per cent, Iowa 7.3 per cent, Wisconsin 7.1 per cent, and Illinois 4 per cent. By sex the population consisted of 317,554 males and 259,502 females. Males of voting age in 1910 numbered 173,890. There were in 1910 only two cities with a population of 8000 or more. These with their population for 1910 and 1914 (estimated) are as follows: Fargo, 14,331 and 16,351, and Grand Forks, 12,478 and 14,827.

Education. In the percentage of illiteracy North Dakota ranks among the lowest of the States. There were, in 1910, 13,070 illiterate persons of 10 years of age or over, or 3.1 per cent of the entire population. Among native whites of native parentage there were but 349 illiterates, or a percentage of 0.0008, while among foreign-born whites the illiterates numbered 9474, or 1.5 per cent of the entire population. In 1910 there were 156,012 persons of school age (6 to 20 years), of which 117,453 attended school. According to the report of the State Superintendent of Education the children of school age in 1913 numbered 171,872, of which 142,434 were enrolled in the schools. The total number of teachers employed in that year was 7891. Of these 6624 were women and 1267 men. The average monthly salary paid to men teachers was $71.30 and to women $54.20. The total number of organized school districts in 1913 was 1974, in which there were 464 graded schools and 4834 common schools. The total expenditure for all educational purposes was $5,860,755.

The Superintendent of Public Instruction, chosen every two years, is the head of the public schools. There is in each county a county superintendent serving for a term of two years. The Legislature of 1913 created a State Board of Education; department of high school inspector and inspector of rural, graded, and consolidated schools. The 1913 Legislature provided for a teachers' retirement fund and an increased appropriation to high schools to rural, graded, and consolidated schools. County agricultural training schools are conducted in two counties. The consolidation of rural schools has been successfully carried on for many years. In 1913 there were nearly 250 such schools. The State Board of Education grants all teachers' certificates. Summer schools are held in many places, and in nearly all the counties teachers' institutes are conducted each year. There are normal schools at Valley City, Mayville, Minot, and Ellendale. The special schools are the State School of Sciences at Wahpeton, State Normal and Industrial School at Ellendale, State School of Forestry at Bottineau. Institutions of collegiate rank include the University of North Dakota at Grand Forks, which is part of the educational system of the State, and the State Agricultural College at Agricultural College (near Fargo). Other colleges are Fargo College at Fargo, Jamestown College at Jamestown, and Wesley College at Grand Forks. All these are coeducational.

Charities and Corrections. The charitable and correctional institutions are under the jurisdiction of the State Board of Control, created in 1911. They include a hospital for the insane at Jamestown, an institution for the feeble-minded at Grafton, a reform school at Mandan, a school for the blind at Bathgate, a tuberculosis sanitarium at Dunseith, the State penitentiary at Bismarck, and a school for the deaf at Devil's Lake. The Soldiers Home at Lisbon is not under the control of the State board.

History. The whole territory of Dakota was a part of the Louisiana Purchase and was for a long time unorganized. Lewis and Clark in their expedition of 1804–06 spent the first winter near Mandan. British subjects had posts for the fur trade within the territory, and Lord Selkirk, considering it British territory, built a fort near Pembina in 1810. Previously, about 1780, French Canadians had settled at this place. Frémont in 1839 explored much of the country, and Lieutenant Warner in 1855 made a report on the region for the government. The Sioux Indians in 1851 ceded a portion of their lands to the government, which were opened for settlement. The part east of the Missouri River was first attached to the Territory of Minnesota in 1849. The part west, together with much of Idaho, Wyoming, and Montana, became part of Nebraska Territory in 1854. On March 2, 1861, the Territory of Dakota was organized.

The Indians were hostile and population was sparse until after 1866. With the growth of population came agitation for statehood, and the Territory was divided into two (see SOUTH DAKOTA), and on Feb. 22, 1889, Congress authorized the calling of conventions to form constitutions. The convention for North Dakota met at Bismarck (July 4) and formed a constitution. It was ratified in October, together with a prohibition article which was submitted separately. On November 2 President Harrison declared the State admitted. In the main, the State has been Republican, with the exception of the election of 1892, when a fusion of the Farmers' Alliance with the Democrats gave them control, and those of 1908 and 1910, when the Democrats elected a governor. The Democratic candidate for the presidency had a small plurality in 1912, but a Republican governor was elected.

North Dakota, in common with many other Southern and Western States, has attempted strictly to supervise the great railroads passing through its territory. In 1907 the Legislature passed several laws aiming at such supervision.

These included a measure fixing the maximum passenger rate at two and one-half cents per mile.

In the presidential election of 1908 Taft received 57,771 votes and Bryan 32,900. The Democrats, however, elected their candidate John Burke for Governor. All the other State officers chosen were Republican. The Democrats reëlected Governor Burke in 1910. Porter J. McCumber and Asle J. Gronna, both Republicans, were nominated for the United States Senate and were elected by the Legislature in January, 1911. In the presidential primary election held on March 21, 1912, Senator La Follette was the successful Republican candidate, while Governor Burke received the Democratic votes. In the November election Wilson received 29,516 votes, Roosevelt 25,629, and Taft 22,802. The Republicans elected L. B. Hanna Governor. The Legislature of 1913 passed several important measures relating to the elections. These included an absent voters act (see *Government*, above). In 1914 L. B. Hanna was reëlected Governor and A. J. Gronna United States Senator. There are three Representatives in Congress.

GOVERNORS OF NORTH DAKOTA

John Miller	Republican	1889–91
Andrew H. Burke	"	1891–93
E. C. D. Shortridge	Democratic-Independent	1893–95
Roger Allin	Republican	1895–97
Frank A. Briggs	"	1897–99
Frederic B. Fancher	"	1899–1901
Frank White	"	1901–05
E. Y. Sarles	"	1905–07
John Burke	Democrat	1907–13
L. B. Hanna	Republican	1913–

Bibliography. F. H. Hagerty, *The State of North Dakota: An Official Statistical, Historical, and Political Abstract* (Aberdeen, S. Dak., 1889); J. P. Finley, *Certain Climate Features of the Two Dakotas* (Washington, 1893); D. E. Willard, *Story of the Prairies* (5th ed., Fargo, 1908); J. E. Boyle, *Government of North Dakota* (New York, 1910); W. C. Gilbreath, *North Dakota and her Magnificent Resources* (Bismarck, 1912); North Dakota Historical Society, *Collections* (ib., 1906 et seq.); State Geological Survey, *Reports* (ib., 1901 et seq.).

NORTH DAKOTA, UNIVERSITY OF. A State coeducational institution for higher education founded at Grand Forks, N. Dak., in 1883. By the enabling Act under which North Dakota was admitted into the Union, the university received a grant of 86,080 acres of land, and the school of mines a grant of 40,000 acres. The university includes a college of arts, a school of education, a school of law, a school of medicine, a school of mechanical and electrical engineering, and a school of mines. The attendance in all departments in 1914–15, including the summer session, was 1241, and there were 84 instructors and officers. The college property in 1915 was valued at $2,600,000, which includes the campus of 120 acres, valued with the college buildings at $500,000. The productive funds amounted at the end of that year to $1,570,750 and the annual income to about $230,000. The university-extension work is carried on by means of lectures given in different parts of the State, by citizens' institutes, and by correspondence courses. There are maintained at the university a public-health laboratory, the United States Weather Bureau, the Geological Survey; at Hebron is the mining substation, at Devil's Lake the biological station. For these activities the State makes an additional annual appropriation of about $22,000. The president in 1915 was Frank C. McVey, LL.D.

NORTH DAKOTA AGRICULTURAL COLLEGE. An institution for agricultural and scientific education founded at Agricultural College, N. Dak., in 1890. It is a State institution and is supported chiefly by appropriations by the State Legislature. The divisions of the college include agriculture, engineering, home economics, literature and science, pharmacy, veterinary medicine, and surgery. The total number of students in all departments in 1915 was 910, of whom 645 were in secondary and 265 in collegiate courses. An endowment consisting of a land grant amounted to $2,500,000, and the value of college grounds and buildings was $236,000. The annual income is about $220,000. The library contains approximately 25,000 volumes. The president in 1915 was John Henry Worst, LL.D.

NORTH DITHMARSCHEN. See DITHMARSCHEN.

NORTH DOWNS. A ridge of hills in England. See DOWNS.

NORTHEAST. A borough in Erie Co., Pa., 14 miles northeast of Erie, on the New York Central and the New York, Chicago, and St. Louis railroads (Map: Pennsylvania, B 1). Aside from fruit growing the chief industries are the manufacture of grape juice and copper. Northeast contains St. Mary's College (Roman Catholic). The water works are owned by the municipality. Pop., 1900, 2068; 1910, 2672.

NORTHEAST BOUNDARY DISPUTE. In American history, the name applied to the long-standing dispute between the United States and Great Britain concerning the northeastern boundary of the United States. The controversy grew out of a difference in interpretation of the second article of the Treaty of Paris of 1783, which undertook to define the boundaries between the United States and Canada. In this article the boundary between Maine and New Brunswick was described as the St. Croix River, and it was soon found to be a difficult matter to determine what was the St. Croix River. Complaints were made that the British were encroaching upon American territory, and collision between the Americans and the English intruders gave forebodings of international trouble. In 1794 John Jay was charged, among other things, with the settlement of the dispute. The only thing he accomplished as to this was the securing of a provision in the treaty negotiated by him (see JAY TREATY) for the appointment of three commissioners to trace the course of the St. Croix River. The commissioners met at Halifax in March, 1798, and located the St. Croix, but left unsettled the place of its source. A new difficulty arose over the ownership of the Passamaquoddy Bay islands, which lie near the mouth of the St. Croix River. No settlement could be reached on this point until 1814, when an article was incorporated in the Treaty of Ghent for the appointment of a commission to bring about some adjustment. By a decision of the commission rendered in 1817, Moose, Dudley, and Frederick islands were awarded to the United States, the others to Great Britain.

Still another disputed point was the determination of the boundary line from the source of the St. Croix to the highlands which separate the waters flowing into the St. Lawrence from those which make their way into the Atlantic Ocean. Various efforts were made by the two governments to reach an agreement on this point, and provisions for this purpose were made in treaties both in 1803 and in 1807, but neither treaty was ever ratified. Finally the Treaty of Ghent provided for the appointment of a commission to settle the dispute, with the reservation that if an agreement could not be reached the disputed question should be referred to the arbitration of a friendly sovereign. The chief task of the commissioners was the determination of the "northwest angle of Nova Scotia" mentioned in the treaty and the "northwesternmost head of the Connecticut River." The commissioners were unable to agree as to the location of these points. In 1827 a convention was concluded between the two Powers for the reference of the question to the King of the Netherlands. In January, 1831, he made his decision awarding part of the disputed territory to the United States and part to Great Britain. Finding it next to impossible to execute the Treaty of 1783, the King drew a boundary line of his own. The decision was satisfactory to neither party, and was formally rejected by the government of the United States. Meantime border riots and collisions were occurring in the disputed territory to the disturbance of the general peace and security. Several efforts were then made to reach a compromise, but without effect. Finally the dispute was settled by the Webster-Ashburton Treaty (q.v.) of 1842.

NORTHEAST CAPE. The most northerly point of Asia. See SEVERO CAPE.

NORTHEAST PASSAGE. A sixteenth-century dream of commercial relations with the Orient, via the Siberian Ocean, which in the twentieth century has materialized as a practical sea route for the commerce of northern Asia. The expedition of Willoughby (q.v.) and Chancellor (1553) opened up the passage from the North Sea to Archangel Bay. Burrough (1556) and Pet (1580) discovered and explored the Waigat Strait leading into Kara Sea, south of Nova Zembla. Most important were the three voyages of W. Barents. In 1594 he traced the west coast of Nova Zembla to the Orange Islands, lat. 77° N. In 1595 he failed to pass through the Waigat, but in 1596, sailing with Heemskerk, he rounded the North Cape and wintered in Icehaven, on the east coast of Nova Zembla, Barents dying during the retreat by boats the following summer. The voyage proved that this northern route, though possible in very favorable seasons, was not generally practicable. It opened up profitable fisheries which have flourished for three centuries. One whaler, E. H. Johannesen, quite fully navigated Barents Sea (1869) and discovered (1878) and circumnavigated Lonely (Eisamkeit) Island, lat. 77° 31′ N., long. 86° E. Russian explorers charted (1636–48) long stretches of the Siberian coast line. Among others E. Busa completed that between the Olenek and Yana. S. Deshneff's reported voyage (1648)—from Kolyma through Bering Strait to Kamchatka, is probably apocryphal. The "great survey" planned by Peter the Great engaged (1725–42) many explorers. Among the most important were the Laptievs, Chariton discovering North Cape (Chelyuskin) of Asia (1742), while Dmitri (1737–42) skirted the coast through thirty degrees of longitude, from the Lena River to Cape Baranov, thus practically completing the continental shores and demonstrating the continuity of the passage. Incidentally related to the passage was the discovery of islands to the north of Asia—the New Siberia Islands (q.v.) by Vaghin (1771), Bennett by De Long (1881), and Nicholas II Land (q.v.) by Vilkitski (1913). The question engaged the attention of Baron Nordenskiöld (q.v.), whose experiences in two voyages (1875, 1876) from the Baltic, via Kara Sea, to the Yenisei convinced him that the passage was possible. Sailing from Sweden in the *Vega*, he made (1878–80) the circumnavigation of Asia and Europe, being detained one winter at Cape Szerde Kamen, long. 173° 23′ E., lat. 67° 7′ N., not far from Bering Strait.

The pioneer in establishing the practicability of the Siberian sea route was Joseph Wiggins (q.v.), who made six voyages (1874–94) from the North Sea to Asia, six vessels reaching the lower Yenisei in 1889. The Russian government lately began a thorough survey of the Siberian Ocean to determine the most available routes. The western half appears to be well established, as Jonas Lied made (1913) a voyage of 3000 miles from the Baltic to the Yenisei and in 1914 conducted a fleet of several ships over the same route. The regions thus served have a population of about 3,000,000, with immense products of grain and of stock, hitherto debarred from the European markets. The eastern route from the Lena and the Kolyma valleys, via Bering Strait to Vladivostok, has been occasionally utilized. Consult Henry Johnson, *Life and Voyages of Captain Joseph Wiggins* (New York, 1907). See POLAR RESEARCH.

NORTHERN BAPTISTS. The name commonly applied to that branch of the regular division of the Baptist denomination which has its chief membership in the northern section of the United States. It is thus distinguished from the Southern Baptists, the other regular division of the Baptist denomination. There were, in 1914, 1,238,323 communicants, 9570 churches, and 8275 ministers in this branch of the denomination. The missionary and other activities are administered by the Northern Baptist Convention, a semiofficial body created in 1907. See BAPTISTS.

NORTHERN LIGHTS. See AURORA BOREALIS.

NORTHERN RHODESIA. See RHODESIA, NORTHERN.

NORTHERN SECURITIES CASE. An important case decided by the United States Supreme Court in 1903 (Northern Securities Company *v.* United States, 193 U. S. 197) involving the legality under the Sherman Antitrust Law (1890) of combinations of railroad corporations engaged in interstate commerce. The Northern Securities Company was a corporation organized as a holding company to take over the stock and the control of the Northern Pacific and the Great Northern railway companies, and the question presented to the court was whether the transaction constituted a "contract, combination . . . or conspiracy in restraint of interstate or foreign trade or commerce," such combination being declared by the Act in question to be illegal. As the constitutionality of the Act was questioned, the court was also called upon to determine whether Congress had the power to enact it. Both questions were answered in the affirmative by a divided court (five to four) and the Northern Securities Company enjoined from exercising any rights of ownership or control in or over the stock of the two subsidiary companies.

The decision has been criticized on the ground that it construes the Antitrust Law in such a way as to make any combination of competing companies illegal, irrespective of whether such combination is harmful or beneficial to the public interest. Later decisions of the court, especially in the Standard Oil and Tobacco Trust cases (Standard Oil Company *v.* United States, 121 U. S. 1; United States *v.* American Tobacco Company, 121 U. S. 106), have somewhat modified this construction by applying the "rule of reason," confining the operation of the statute to cases of an "undue" or improper restraint of interstate commerce.

Consult: Canfield, "The Northern Securities Decision and the Sherman Anti-Trust Act," in *Columbia Law Review*, vol. iv (New York, 1904); B. H. Meyer, *History of the Northern Securities Case* (Madison, Wis., 1906); T. H. Calvert, *Regulation of Commerce under the Federal Constitution* (Northport, N. Y., 1907); F. J. Goodnow, *Social Reform and the Constitution* (New York, 1911); F. R. Coudert, *Certainty and Justice* (ib., 1913).

NORTHERN TERRITORY. A territory of the Commonwealth of Australia lying between Western Australia and Queensland on the west and east respectively and extending from South Australia north to the Timor and Arafura seas. The length of the territory from north to south is about 900 miles, the breadth about 560 miles, the length of coast line about 1040 miles. The estimated area is 523,620 square miles. The coast, which is generally low and flat, is indented with bays and inlets and intersected by numerous rivers, many of which are navigable for considerable distances. From the coast southward the land rises to the seventeenth or eighteenth parallel, where still higher elevations form the watershed between the rivers that flow northward to the sea and those that form the scanty interior systems. There are several mountain ranges, trending in general east and west. There are two seasons—the wet, from November to April, and the dry, from May to October. The vegetation is tropical. There is a luxuriant growth along the coast, where the mangrove is conspicuous, but the timber trees are not of great commercial value. On the ranges are pine, fig, and orange trees, but over wide expanses far inland vegetation is scanty. The territory is the habitat of the ordinary types of native Australian fauna. Marsupials, numerous birds, fresh-water tortoises, crocodiles, snakes (mostly nonvenomous), and frogs are common. Butterflies, beetles, the white ant, sand flies, and mosquitoes abound.

The population is exceedingly sparse. In 1881 the number of Europeans was 670; at the end of 1912 it was estimated at 1931. The Chinese population has decreased since 1888, the estimate for 1912 being 1246. The highest recorded population, excluding aboriginals, was 7533 in 1888; the estimate for 1912 was 3475 (2854 males, 621 females). The census population in 1901 was 4811 and, in 1911, 3310, these figures being exclusive of full-blooded aboriginals. The estimate for 1914 was 3588. The number of full-blooded aboriginals in the employ of whites or living in a civilized or semicivilized condition was 1223 at the 1911 census. So imperfectly known at present is the vast territory that its total black population cannot be stated with accuracy, but the number has been estimated at upwards of 20,000. The capital and principal town and port is Darwin, formerly called Palmerston, situated on Port Darwin, one of the largest harbors in the world; its population (local government area) in 1911 was 919.

There is little agriculture, though parts of the territory are well adapted to the cultivation of tropical products, especially sugar cane. Large areas are suitable for stock raising. At the end of 1913 there were 22,800 horses, 418,000 cattle, 67,000 sheep, and 1000 swine. The mineral production decreased from a value of £70,042 in 1908 to £55,299 in 1912; in the latter year the gold output was valued at £20,150; tin ore, £27,001; copper ore, £3998; wolfram, £3330. In 1901 imports and exports were valued at £108,886 and £302,931 respectively; in 1910, £52,398 and £269,063. The over-sea trade in 1913 was: imports, £21,097; exports, £67,911. There is a railway (3½-foot gauge) from Darwin to Pine Creek, 145 miles. The extension of this line is projected 1140 miles, to Oodnadatta in South Australia. It is stated that the completion of this north-and-south transcontinental line would bring London within 17 days of Adelaide. A transcontinental telegraph line was completed in 1872 between Adelaide and Darwin (2230 miles); from Darwin telegraphic communication is provided with Europe and Asia via Banjuwangy (Java), Singapore, and Madras.

The Northern Territory was annexed by South Australia in 1863 and was administered through a government Resident at Darwin to the end of 1910. Pursuant to an agreement between the South Australia and federal governments, the territory was transferred to the Commonwealth on Jan. 1, 1911. There is a resident administrator with supreme authority in internal affairs. The federal government assumed responsibility for South Australia's loans in respect of the territory, purchased the Port Augusta-Oodnadatta Railway (in South Australia), and agreed to complete the line so as to connect Port Augusta with Darwin.

NORTHFIELD. A town in Worcestershire, England. See KING'S NORTON AND NORTHFIELD.

NORTHFIELD. A town in Franklin Co., Mass., 42 miles (direct) north of Springfield, on the Central Vermont Railroad and on the Connecticut River (Map: Massachusetts, C 2). The birthplace of Dwight L. Moody (q.v.), Northfield has become, as a result of his influence, a noted centre of religious education and training. Northfield Seminary for Young Ladies, founded in 1879, and Mount Hermon School for Boys, in the town of Gill, are incorporated as the Northfield Schools. The annual summer conference of Christian workers and the Student Conference have made the town of considerable repute as a summer resort. Northfield has the Dickinson Public Library. The inhabitants are interested principally in agriculture. The town was incorporated in 1672. Its affairs are administered by town meetings. Pop., 1900, 1966; 1910 (excluding students), 1642.

NORTHFIELD. A city in Rice Co., Minn., 43 miles south of Minneapolis, on the Cannon River and on the Chicago, Milwaukee, and St. Paul, the Chicago, Rock Island, and Pacific, and the Minneapolis, St. Paul, Rochester, and Dubuque railroads (Map: Minnesota, D 6). It is the seat of Carleton College, opened in 1870, and of St. Olaf College (Lutheran), opened in 1875, and has an Odd Fellows' home for aged people and homeless children, Scoville, Steensland, and Carnegie libraries, and the Goodsell Observatory. The city is the centre of a productive farming region, and has manufactures of galvanized-iron products and woolen knit goods. Settled in 1856, Northfield was chartered as a city in 1875, the charter of that date being still in operation and providing for a government vested in a mayor, elected every two years, and a unicameral council. The water works are owned and operated by the municipality. Pop., 1900, 3210; 1910, 3265.

NORTHFIELD. A town, including a village of the same name, in Washington Co., Vt., 10 miles (direct) south by west of Montpelier, the State capital, on the Dog River and on the Central Vermont Railway (Map: Vermont, C 4). It is the seat of Norwich University, established in 1819 and incorporated in 1834. The village has the Carnegie and Brown public libraries, a soldiers' monument and another to Charles Paine, Governor of the State (1841–43). Valuable deposits of granite and black slate are quarried in this vicinity. Dairying, and the manufacture of lumber products, hosiery, and woolen goods are the principal industries. The village of Northfield was first incorporated in 1855. There are a municipal electric-light plant and water works. Pop., 1900, 2855; 1910, 3226.

NORTHFIELD CONFERENCES AND SUMMER SCHOOLS. A series of conferences for Christian workers, established at East Northfield, Mass., in 1882 by Dwight L. Moody. The first meeting held was a Student Conference which met in 1886 and has met annually since that year. Its object is to interest students of colleges in the various phases of religious work, especially mission work. The General Conference of Christian workers was first held in 1888 and has met annually ever since. Other annual conferences are the Young Women's Conference, the Sunday School Workers Conference, the Home Mission School, and the Foreign Missionary School. In connection with the conference is the Mount Hermon School, which offers courses in Bible study during the summer. Since D. L. Moody's death the work has been in the general charge of his two sons.

NORTH'FLEET. A town and urban district in Kent, England, on the Thames, about 1½ miles west of the municipal borough of Gravesend. Its industries comprise shipbuilding, chemical works, chalk and lime pits, cement factories, and brickyards. Of chief interest are the thirteenth-century church of St. Botolph and Huggens College, established in 1847. Pop., 1901, 12,906; 1911, 14,184.

NORTH FORELAND. See FORELAND, NORTH AND SOUTH.

NORTHGATE, DAN MICHEL OF. See MICHEL, DAN, OF NORTHGATE.

NORTH GERMAN CONFEDERATION. A union of German states north of the Main, formed in 1866 under the hegemony of Prussia, following on the defeat of Austria in the Seven Weeks' War (q.v.) and the dissolution of the Germanic Confederation. (See GERMANY.) It was first organized in August with 18 states, the number being increased to 22 before the end of October. A constitution was adopted which, with slight modifications, is that of the present Germany. Offensive and defensive alliances were concluded with Bavaria, Baden, and Württemberg, by which these states agreed to place, in case of war, their military forces under the command of the King of Prussia. The Franco-German War brought complete unity to Germany. On Jan. 18, 1871, the King of Prussia, at Versailles, assumed the title of German Emperor, and in April the constitution of the Confederation, so amended as to provide for the rights of the newly admitted South German states, was promulgated for the Empire.

NORTH HOLLAND. A province of the Netherlands occupying the peninsula lying between the Zuider Zee and the North Sea (Map: Netherlands, C 2). It includes also the islands of Texel and Vlieland of the West Friesian Islands. Area, 1069 square miles. The province contains but little forest, the greater part being low meadow and moorland protected along the coast by dunes and dikes. Agriculture, gardening, floriculture, cattle raising, dairying, and in the cities linen manufacturing are the principal industries. The province is traversed by a number of canals, the most important of which are the North Holland Canal, between Amsterdam and Helder, and the North Sea Canal, connecting the Zuider Zee and the North Sea directly. Pop., 1899, 968,131; 1910, 1,122,995. Capital, Haarlem; largest city, Amsterdam. For history, see HOLLAND; NETHERLANDS.

NORTH'INGTON, ROBERT HENLEY, first EARL OF (c.1708–72). An English Lord Chancellor, son of Anthony Henley. Educated at Westminster School and at St. John's and All Souls, Oxford, he studied at the Inner Temple. For 10 years he was member for Bath in the House of Commons. He joined the Leicester House party, headed by the Prince of Wales, whose object was to undermine the power of Sir Robert Walpole. Highly successful at the bar, in 1756 he became Attorney-General, in 1757 Lord Keeper of the Great Seal (being the last person to hold the title of Lord Keeper), and, although a commoner, was appointed Speaker of the House of Lords. In 1760 he was made Lord Henley in order that he might preside over the House of Lords as Lord High Steward at the trial for murder of the fourth Earl Ferrers. The year following he became Lord Chancellor. He retired from the chancellorship in 1767. He was a great favorite of George III, belonged to the King's Friends, a political clique formed to increase the royal power, and was commonly known as Tom Tilbury or Surly Bob. Consult Lord Henley's *Memoir* (London, 1831).

NORTH ISLAND. See NEW ZEALAND.

NORTH KINGSTOWN. A town in Washington Co., R. I., 23 miles by rail south of Providence, on the New England Navigation Company line. Noteworthy features are the public library, town hall, and high school buildings, Shepard School, the Old Narragansett Church, built in 1707, Smith's blockhouse, built in 1638, and the Indian graveyard. Pop., 1900, 4194; 1910, 4048.

NORTHMEN. See NORMANS.

NORTH PLAINFIELD. A borough in Somerset Co., N. J., 28 miles by rail west of New York City, on the Central Railroad of New Jersey. It is the seat of Mount St. Mary's College and Herbert's Hall for Exceptional

Children. Of interest in the vicinity are Washington Rock, Elsinore Castle, and Wetumpka Falls. The chief industrial establishments include fruit canneries, a woodworking factory, bottling works, and a telescope factory. Stone is quarried extensively and there are large orchards, stock farms, and dairies. Pop., 1900, 5009; 1910, 6117.

NORTH PLATTE. A town and the county seat of Lincoln Co., Neb., 291 miles west of Omaha, at the junction of the North and South Platte rivers and on the Union Pacific Railroad (Map: Nebraska, D 3). It has a United States land office, Federal district court, State experimental substation, and a Carnegie library. The industrial establishments include extensive railroad machine shops, a cold-storage plant, and large flour mills and grain elevators. North Platte is the centre of an irrigated section and is an important shipping point for alfalfa, sugar beets, and cattle. The water works are owned by the municipality. Pop., 1900, 3640; 1910, 4793.

NORTH PROVIDENCE. A town and the county seat of Providence Co., R. I., 5 miles from Providence, on the New York, New Haven, and Hartford Railroad. It contains a public library. The manufacture of woolen goods constitutes the chief industry. Pop., 1900, 3016; 1910, 5407; 1915 (State census), 6780.

NORTH RIVER. The name applied to the lower course of the Hudson River.

NORTHROP, nôrth′rŭp, CYRUS (1834–). An American university president, born in Ridgefield, Conn. He graduated at Yale in 1857 and at the law school there in 1859. Two years later he was appointed clerk of the Connecticut House of Representatives and in 1862 clerk of the Senate. He was professor of rhetoric and English literature at Yale from 1863 to 1884, and from then until 1911, when he became president emeritus, he was president of the University of Minnesota. During this period the institution came to take rank as one of the leading and most progressive of the State universities. Dr. Northrop published *Addresses, Educational and Patriotic* (1910).

NORTH SEA, or GERMAN OCEAN (Lat. *Germanicum Mare,* Ger. *Nord See,* Dan. *Vesterhavet,* west sea). That part of the Atlantic between the east coast of Great Britain and the continent of Europe (Map: Europe, D 3). It is pear-shaped in general outline, with a wide opening northward into the Atlantic Ocean and with a narrowing arm extending from the main oval body southward to the Strait of Dover, which, with the English Channel, forms the southern communication with the Atlantic. On the east the Skagerrak leads between Jutland and Norway into the Cattegat, which connects through the Sound and the Great and Little Belts with the Baltic Sea. The greatest width of the North Sea, between Dundee, Scotland, and the entrance of the Limfjord in Jutland, is 412 miles; its greatest length from north to south is 680 miles; and its area is about 200,000 square miles, of which 2500 square miles are occupied by islands. A number of large rivers flow into the southern part of the North Sea; the chief of these are the Elbe, Weser, Ems, Rhine (which is joined at its mouth by the Meuse), and Scheldt on the Continent, and the Thames and the Humber in Great Britain. These render the water less saline than that of the main ocean, though the salinity is greater than that of the Baltic, the percentage of salty constituents being 1.025 in the southern part of the sea. They also contribute their sediment to the formation of the numerous shoals and sand banks which line the south and southeast shores. These shores are very low, the land in many places lying below the sea level. They have been much encroached upon by inundations, which have left the higher portions of the former coast line as a chain of islands. Behind these are a series of shallow lagoons and inlets, of which the most notable are the Jade (q.v.) in Germany and the Zuider Zee (q.v.) in Holland.

In general the depth of the North Sea increases gradually northward. The mean depth of the southern portion is about 100 feet, near the middle it is 250, and in the north 400 feet. Along the steep, rocky coast of Norway there runs a trough, The Norway Deep, with a depth of nearly 1000 feet within 20 miles of the shore and a maximum depth of over 2400 feet at the entrance of the Skagerrak. On the other hand, there are in the southern half of the sea, besides the shoals mentioned along the coast, several shallow regions rising considerably above the mean level of the bottom. Among these the Dogger Bank occupies a large portion of the south-central part of the sea, with a depth of 60 to 100 feet, the surrounding depths being 150 to 200 feet. The tides of the North Sea are very irregular, owing to the fact that two tidal waves enter it, one from the north and one from the south. The former sweeps southward along the west shore, the latter northward along the east coast. Midway between the shores there seems to be very little rise and fall and at some points none at all, while in some places on the south shore, where the two waves unite, there is a difference of 20 feet between high and low tide. Rain and fogs occur at all seasons, and the violent northwest storms blowing towards the shoals on the southeast coast make navigation there exceedingly dangerous, especially along the coast of Jutland. Its fisheries provide support for many thousand inhabitants of the surrounding countries. By means of the Kaiser Wilhelm Canal ships enter the Baltic Sea without making the passage around Jutland. Consult: Fulton, "On the Currents of the North Sea and their Relation to Fisheries," *Scotland Fishery Board Report for 1896;* J. M. Phaff, *Etude sur les courants de la mer du Nord* (The Hague, 1899); H. J. Mackinder, *Britain and the British Seas* (New York, 1902); P. Walther, *Land und See* (Halle, 1907); Walter Wood, *North Sea Fishers and Fighters* (New York, 1912). See WAR IN EUROPE.

NORTH SHIELDS. A seaport of England. See SHIELDS, SOUTH AND NORTH.

NORTH SMITHFIELD. A town in Providence Co., R. I., 6 miles from Woonsocket, on the New York, New Haven, and Hartford Railroad. Bleaching constitutes its chief industry. Pop., 1910, 2699.

NORTH STAR, ORDER OF THE. A Swedish civil order of merit with four classes, founded in 1748 by Frederick I. The decoration is an eight-pointed white star surmounted by a crown and suspended from a black ribbon. The round, blue shield bears the polar star with five rays and the device "Nescit occasum" (It never sets). It is conferred especially for notable scientific achievements. See Plate under ORDERS.

NORTH SYDNEY. A town in Cape Breton

County, Nova Scotia, Canada, on the Intercolonial Railway, 5 miles from Sydney (Map: Nova Scotia, K 4). Steamships run to Montreal, Quebec, Halifax, Charlottetown, St. John's, and to Port aux Basques, Newfoundland. There is a flourishing fishing industry. Among the manufacturing establishments are granite works, planing mills, machine shops, and manufactories of aërated waters and stoves. Pop., 1901. 4646; 1911, 5418.

NORTH TARRYTOWN. A village in Westchester Co., N. Y., 26 miles north of New York City, on the east bank of the Hudson River and on the New York Central and Hudson River Railroad (Map: New York, B 2). It is an industrial village and manufactures automobiles. It is near Sleepy Hollow, the scene of Irving's *Legend of Sleepy Hollow*, and has an old Dutch church and cemetery, in which are the graves of Washington Irving, Paul Leicester Ford, and Carl Schurz. Pop., 1900, 4241; 1910, 5421.

NORTH TONAWANDA, tŏn′ȧ-wŏn′dȧ. A city in Niagara Co., N. Y., 5 miles by rail north of Buffalo, on the Niagara River, at the mouth of Tonawanda Creek, which separates the city from Tonawanda, also on the Erie Canal and on the Erie, the Wabash, the West Shore, the Lehigh Valley, the International Electric, and the New York Central railroads (Map: New York, B 4). It is an important industrial and commercial centre, known especially for its lumber and iron interests. There is an extensive production of pig iron, nuts and bolts, structural steel, concrete building blocks, furniture novelties, gas motors, automatic organs, and steam merry-go-rounds. The manufactures include also roofing material, steam piping, steam radiators, steam pumps, motor boats, and miniature railroads. According to the census of 1910, an aggregate capital of $8,274,000 was invested in the various industries, the production of which was valued at $9,600,000. There is a Carnegie library. North Tonawanda was chartered as a city in 1897. The water works are owned by the municipality. Pop., 1900, 9069; 1910, 11,955; 1915 (State census), 13,530.

NORTH UIST. See Uist.

NORTHUM′BERLAND. The northernmost county of England (Map: England, D 1). The whole surface, except the narrow coastal region, is uneven, with rounded hills, moorlands, and fertile wooded valleys, rising from east to west and culminating in the Cheviot Hills on the borders of Scotland. The summers are cooler, but the winters milder, than in the southern counties. The coast region and the valleys are cultivated, producing barley, wheat, and vegetables; the western part is largely pastoral. The chief industries are coal mining, mining of lead and zinc, and the manufacture of iron, rope, glass, chemicals, and pottery. There are salmon fisheries of importance. Pop., 1901, 603,119; 1911, 696,893. The county returns four members to Parliament. Newcastle-upon-Tyne, the chief city of Northumberland, is a separate county borough. Among the considerable towns are Tynemouth, Wallsend, and Cowpen. Northumberland contains numerous historic landmarks, including remains of Hadrian's Wall and of Roman military roads and famous battle fields of the Scottish wars.

Bibliography. John Hodgson, *History of Northumberland* (Newcastle, 1820-40), is the standard work, and is continued in Hodgson-Hinde, *General History of Northumberland* (ib., 1858). Materials collected by Hodgson are also used in E. Bateson, *History of Northumberland* (9 vols., ib., 1893–1909), an elaborate and complete work. Consult also: W. S. Gibson, *Northumberland Castles, Churches, and Antiquities* (London, 1848–54); Bruce, *Roman Wall* (ib., 1874); Lebour, *Geology of Northumberland and Durham* (Newcastle, 1886); C. J. Bates, *History of Northumberland* (London, 1895).

NORTHUMBERLAND. A borough in Northumberland Co., Pa., 54 miles north of Harrisburg, the State capital, on the Susquehanna River and on the Pennsylvania, the Philadelphia and Reading, and the Delaware, Lackawanna, and Western railroads (Map: Pennsylvania, H 5). The river is spanned here by two large bridges. Owing to its excellent shipping facilities Northumberland is rapidly attaining importance as an industrial centre. Extensive freight yards, with shops, roundhouse, and offices, have been built by the Pennsylvania Railroad. Other important industrial establishments include large forge works, a nail mill, a hat and cap factory, a planing mill, iron works, and a silk and throwing mill. In the vicinity are mineral springs and deposits of iron ore and limestone. Pop., 1900, 2748; 1910, 3517.

NORTHUMBERLAND, Earls of. See Percy.

NORTHUMBERLAND, John Dudley, Duke of. See Dudley, John; Grey, Lady Jane.

NORTHUMBERLAND, Robert de Mowbray, Earl of (?–c.1125). An English baron, whose father and uncle crossed over with William the Conqueror. He was created Earl of Northumberland about 1081, and seven years afterward fought to support Robert of Normandy's claim to the English crown against that of the latter's younger brother, William Rufus. He burned Bath, besieged Ilchester, carried fire and sword over western Wiltshire, and then began a conflict with the Bishop of Durham. His next antagonist was King Malcolm of Scotland, whom he slew near Alnwick in 1093, and two years afterward he headed an insurrection against William Rufus in favor of his cousin, the Count d'Aumale. The King besieged Northumberland in his strong castle at Bamborough, and the Earl, being lured therefrom on a pretense, was captured after a stout resistance at Tynemouth Monastery. It is supposed that he was kept a prisoner for the rest of his life. Consult E. A. Freeman, *William Rufus* (Oxford, 1882), and H. W. C. Davis, *England under the Normans and Angevins* (New York, 1905).

NORTHUM′BRIA (ML. *Northumbria*, from AS. *norþ*, north + *Humbre*, Humber). In Anglo-Saxon England, a kingdom of the Heptarchy (q.v.) formed and established by Ida in the middle of the sixth century out of the two earlier kingdoms of Bernicia, extending from the Forth to the Tees, and Deira, extending from the Tees to the Humber. It grew greatly in power during the reign of Ethelfrid (593–617), became the strongest kingdom in the Heptarchy under Edwin (died 633), and under Oswald (died 642) it was the champion of Christianity against pagan Mercia. Its separate existence was brought to an end by Egbert in 827. The name survives in the modern county of Northumberland. Consult Thomas Hodgkin, *The History of England from the Earliest Times to the Norman Conquest* (New York, 1906).

NORTH VANCOUVER. A city in the electoral district of Vancouver, British Columbia, Canada, situated on the north shore of Burrard Inlet, opposite the city of Vancouver (q.v.) (Map: British Columbia, D 5). In 1915 bridge and railway connection with that city was being established. The city is surrounded by a boulevard 150 feet wide. The manufacturing industries include shipbuilding and engineering, and there are also manufactories of sashes, doors, lumber, awnings, furniture, and cigars. The single-tax principle is in force. Pop., 1911, 8196.

NORTH VERNON. A city in Jennings Co., Ind., 65 miles southeast of Indianapolis, on the Baltimore and Ohio Southwestern, the Pittsburgh, Cincinnati, Chicago, and St. Louis, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, F 6). It has a saw mill, foundry, and manufactories of glass chimneys, lawn swings, spokes, and wood brackets. North Vernon owns its water works and electric-light plant. Pop., 1900, 2823; 1910, 2915.

NORTHWEST BOUNDARY DISPUTE. The dispute between the United States and Great Britain concerning the northwest boundary of the United States. By the Treaty of Ghent, concluded between the two governments, Dec. 24, 1814, provision was made for the appointment of two commissions to determine the northern boundary from the St. Lawrence River to Lake Superior and from Lake Superior to the Lake of the Woods. At the same time the American commissioners proposed the forty-ninth parallel from the Lake of the Woods to the Rocky Mountains as a continuation of the northern boundary between the United States and Canada. This proposition, however, was not acceptable to the British negotiators, nor was any agreement upon the subject reached at the time. Meanwhile the occupation of Oregon had extended the boundary dispute to the territory west of the Rocky Mountains. Russia, which claimed part of Oregon, ceded her claims of all territory south of latitude 54° 40′ N. to the United States in 1824. Spain also claimed Oregon on the ground of discovery, but by the Treaty of 1819 quitclaimed her title to land north of the forty-second parallel to the United States, leaving Great Britain and the United States as the only disputants. By the convention of 1818 the two governments accepted the forty-ninth parallel as the boundary between Canada and the United States from the Lake of the Woods to the Rocky Mountains. The proposition of the United States to accept a continuation of that line to the Pacific as a suitable division of the Oregon country between the two claimants was rejected by Great Britain on the ground that it would give the Columbia River to the United States. After fruitless negotiations the United States agreed to accept an arrangement by which the two Powers were to occupy the Oregon territory jointly for a period of 10 years. This was embodied in the convention of 1818. By a convention concluded at London, Aug. 6, 1827, the two governments agreed to extend indefinitely the stipulation of 1818 for joint occupation, with the reservation that the convention was subject to abrogation after Oct. 20, 1828, by either party giving 12 months' notice. During the administration of President Tyler negotiations for the permanent settlement of the dispute were carried on between Secretary of State Calhoun and the British Minister Pakenham, who offered to accept the forty-ninth parallel as far as the Columbia River, and from thence onward the Columbia River itself, as the boundary. The government of the United States declined to accept this proposition, as well as a proposition to submit the question to arbitration. The American public, moreover, was very insistent that no essential rights be waived, and the popular opposition to the making of any concession gave rise to the political watchword, "Fifty-four forty, or fight." Matters thus stood when the presidential election of 1844 occurred. The Democratic party, in its national platform, asserted the right of the United States to the whole of Oregon, and won the election partly on this issue. Notwithstanding this emphatic position of the party, negotiations were resumed, but as Great Britain offered nothing better than the old terms, they were promptly rejected. The President formally withdrew the proposal and reasserted our "rightful claim to the whole of Oregon." In April, 1846, Congress authorized the President at his discretion to give the notice required by the convention of 1827 for its abrogation, and this was accordingly done. Finally the dispute was amicably settled by a treaty concluded in July following (1846), by which it was provided that the boundary line should be the forty-ninth parallel to the middle of the channel which separates Vancouver Island from the continent, and thence southerly through the channel, and the Strait of Juan de Fuca to the Pacific Ocean, the navigation of the channel and straits to remain free and open to both parties. A subsequent dispute between the two governments as to the meaning of the provisions in respect to the channel was referred to the German Emperor (1871) as arbitrator. He decided the following year in favor of the American claim. See SAN JUAN BOUNDARY DISPUTE.

NORTHWESTERN UNIVERSITY. A coeducational institution for higher education at Evanston, Ill., founded in 1851. It is historically connected with the Methodist Episcopal church. The university includes a college of liberal arts and a college of engineering, with schools of law, medicine, pharmacy, dentistry, music, commerce, and oratory. The college of liberal arts and the college of engineering, the school of music and the school of oratory, are at Evanston, while the professional schools are in Chicago. Students are admitted to the university on certificate from accredited schools or by examination. The courses in the college lead to the bachelor's degree in arts and science, the master's degree in arts, and the degree of doctor of philosophy. The college course is largely elective, and provision is made by which the time required for subsequent professional studies may be shortened. Advanced courses are offered to graduate students in connection with the usual work of the university, but in a distinct graduate school. The university maintains three schools for preparatory instruction. The Garrett Biblical Institute, a theological school under Methodist Episcopal control, is on the university campus, and it maintains close relations with the Norwegian-Danish Theological Seminary and the Swedish Theological Seminary, both at Evanston. The student enrollment in all departments in 1914–15 was 5100; of these 1476 were enrolled in the college. The faculty numbered 503, of whom 429 were members of the teaching force. The university campus covers about 125 acres on the shores of Lake Michigan, with well-equipped buildings, including the Dearborn Observatory with its historic 18½-inch telescope. The library contains about 200,000 volumes. The Elbert H. Gary Library of Law contains about 45,000 volumes. The endowment in 1915 was $5,063,028, the income $895,758, and the total value of property under control of the college amounted to $2,784,642. The president in 1915 was Abram W. Harris, LL.D.

NORTHWEST FRONTIER PROVINCE. A province of British India, bounded on the west and north by Afghanistan, on the east by Kashmir and the Punjab, and on the south by Baluchistan. It was formed in 1901 by separating from the Punjab the districts of Peshawar, Kohat, Bannu, and Dera Ismail Khan, lying west of the Indus. Only the district of Hazara is east of the river. These districts, which are directly under British administration, have an area of 13,418 square miles and had a population in 1901 of 2,125,480; 1911, 2,196,933. The Chief Commissioner of the province has also political control over the remaining region along the Afghan frontier, a total of 38,918 square miles of country covered by the Suleiman Mountains. About 2,500,000 acres of the districts around Peshawar are cultivated, and a large portion of this area is irrigated. The capital of the province is Peshawar (q.v.).

NORTHWEST PASSAGE. The effort to discover a navigable sea route from England to Cathay and India via the ocean to the north of America, which began with the voyages of the Cabots (1497) and was pursued intermittently by England, ended with the Franklin expedition (1847), whose seamen, as Richardson says, "forged the last link of the northwest passage with their lives." These voyages resulted in the discovery of the Baffin Bay region (1616) and of the islands situated between that bay and Beaufort Sea, as well as the entire coast line of North America. Parry (q.v.) reached long. 114° W., and thus earned the standing reward of the British Parliament of £5000 for reaching long. 110° W. The northern coasts of North America, along which the northwest passage lies, unknown except by Cook's voyage through Bering Strait (1779) to Icy Cape, were very largely discovered by Franklin (q.v.) in his land expeditions (1819–22, 1825–27), which outlined the coasts for nearly 40 degrees of longitude, from 109° 25′ W. to 148° 52′ W. John Ross (1829–34) added the peninsula of Boothia, and his discoveries were connected with Hudson Bay by Rae (q.v.) in 1846–47. Back (1833–34) explored the region from the Great Fish (Back) River as far eastward as Point Ogle, long. 94° 58′ W. Dease and Simpson (q.v.) filled in the unknown coast to the west to Point Barrow, which had been reached from Bering Strait by Elson (1826) of Beechey's expedition. To the east Dease and Simpson reached the entrance to Simpson Strait, long. 97° 35′ W., and also visited Cape Herschel, lat. 68° 41′ N., long. 98° 22′ W., on King William Land, within 57 miles of the discoveries of Ross. This left unknown the northwestern part of Boothia Land and the southwestern shores of King William Land. Franklin's last expedition (1845–48), after wintering at Beechey Island (Wellington Channel), turned southward the next summer and, passing through Franklin Strait, west of Boothia Land, was ice-beset on Sept. 16, 1846, 15 miles off the northwest coast of King William Land. When the ships were abandoned the retreating party reached Cape Herschel, thus completing the exploration of the navigable waterways along the north coast of the continent. The first party that ever passed from one ocean to the other north of America (by a more northerly route) was that of McClure (1850–53), which in its search for Franklin carried the *Investigator* via Bering Strait to Mercy Bay, Banks Land, where the ship was abandoned, and the crew traveled by sledge to Belcher's squadron, wintering to the eastward, Belcher himself in Northumberland Sound. The only vessel to make the northwest passage was the *Gjoa*, a tiny craft which under Amundsen passed (1903–06) via Lancaster and Peel sounds to a winter harbor of King William Land and thence along the coast through waters navigated by Collinson (1850–55) to Bering Strait.

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NORTHWEST PROVINCES AND OUDH. See UNITED PROVINCES OF AGRA AND OUDH.

NORTHWEST TERRITORIES. The designation for the sparsely inhabited region of Canada which includes the former districts of Mackenzie and Franklin, and part of the former district of Keewatin. The area is 1,242,224 square miles, of which 1,207,926 are land and 34,298 are bodies of water. The Northwest Territories in 1915 contained, with the exception of the Yukon Territory, all of Canada which had not been organized into provinces. They were, historically considered, established by successive delimitations and reductions of that portion of British North America, except Newfoundland, which was not included in the Dominion of Canada and British Columbia at confederation in 1867. The vast region thus indicated contained over 2,600,000 square miles, was under the control of the Hudson's Bay Company, had rather vaguely defined boundaries, and was known as Rupert's Land and the Northwest Territory. In 1869 the Company's rights were purchased by the Dominion and the lands under its control were made part of the Dominion of Canada under the name of the Northwest Territories.

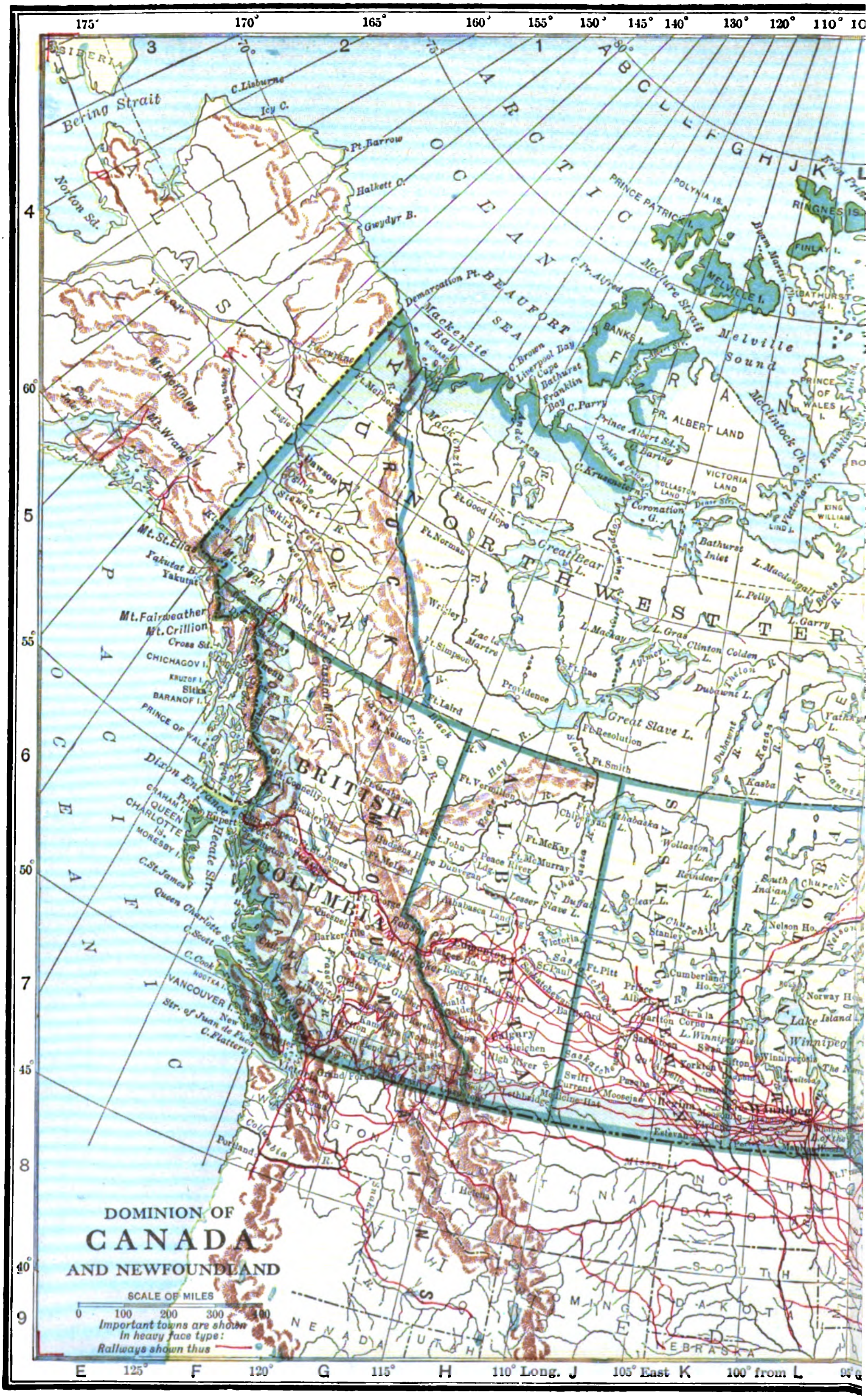
The latter's area of over 2,600,000 square miles was first decreased in 1870 by forming from it the Province of Manitoba (q.v.) (after first enlargement, 73,732 square miles), and second, in 1876, by creating the new provisional district of Keewatin (516,571 square miles), administered by Manitoba. A third decrease was made by the Dominion Parliament in 1882, when for administrative purposes the four districts of Assiniboia (89,000 square miles), Saskatchewan (101,000), Alberta (105,300), and Athabasca (122,000) were created; and a fourth when in 1895 the eastern and northern parts of the remaining unorganized area were divided into the districts of Ungava (354,961), Franklin (500,000), and Mackenzie (562,182). At this time the Northwest Territories according to reliable maps were, strictly speaking, bounded by Alaska on the west and Keewatin on the east, while that part of Keewatin which was north of Ontario, and the territory northwest of Quebec, were named the Northeast Territories. But the latter designation was discontinued, and eventually both the Northwest and the Northeast Territories, together with the district of Keewatin, became known as the Northwest Territories. By a fifth delimitation the Yukon Territory was separately organized in 1898. In the latter year, therefore, all the territory taken over from the Hudson's Bay Company, with the exception of the Yukon Territory, had been divided into one province and eight districts.

Four of these districts (Alberta, Athabasca, Assiniboia, and Saskatchewan) were in 1905 made into the provinces of Alberta and Saskatchewan; but so much of the former districts of Athabasca and Saskatchewan as stretched to the east of a straight line prolonging the western boundary of Manitoba, became part of the Northwest Territories, which then included the districts of Mackenzie, Franklin, Keewatin, and Ungava. The last delimitation took place in 1912, when the provinces of Manitoba, Ontario, and Quebec were enlarged. Manitoba and Ontario respectively received about 178,100 and 146,400 square miles from Keewatin, and Quebec received 354,961, including the district of Ungava and that part of Labrador which is within the Dominion of Canada.

The Northwest Territories were thus reduced in 1912 to their present area, and the districts of Mackenzie and Franklin and the northern part of Keewatin were merged therein. As now defined they consist mainly of a broken plain draining into the Arctic Ocean. The climate is trying and rigorous; brief summers are succeeded by long and very cold winters. The forest growth is abundant in the south but becomes poor and stunted, or entirely disappears in the north, which is barren save for lichens and mosses. The chief lakes, together with the area in square miles of some of the larger, are the Great Bear (11,821), Great Slave (10,719), Dubawnt (1654), Lac la Martre (1225), and Baker (1029). The principal rivers are the Mackenzie (q.v.), Coppermine, Backs, Dubawnt, Thelon, Kazan, Peel, Arctic Red, Gravel, Hare Indian, McFarlane, Rivière la Roncière le Nourey, Burnside, Quoich, and Maguse. Of these the first three are the largest and empty into the Arctic Ocean. Geologically, the Northwest Territories are mainly of the Laurentian formation. The Mackenzie River basin is heavily wooded with aspen, poplar, birch, tamarack, pine, and spruce. There are lignite deposits along the Mackenzie River, and coal and salt are found in the Great Slave Lake region. Gold and copper occur in the east, but as large parts of the vast region are unexplored, it is impossible to indicate the variety and extent of mineral deposits. None have yet been discovered in the north, which is a collection of Arctic islands with very little animal and vegetable life. Thus far the most valuable asset has been the trade in skins of fur-bearing animals.

The agricultural resources are very small, only the south allowing a limited cultivation of the hardier cereals and roots. In the Northwest Territories are the chief breeding grounds of nearly all the wading birds (q.v.) and of the larger game birds excepting the grouse family. The only winter game bird is the ptarmigan. The mammals include the polar bear, black bear, Arctic fox and hare, barren-ground caribou, musk ox, elk, moose, beaver, marten, otter, mink, ermine, and pied lemming. The lakes and rivers in the southern parts teem with food fish. The population consists mostly of Indians and half-breeds, with a few white settlers and fur traders. In 1901 it numbered 20,129; in 1911 it had declined to 18,481; and in 1915, though unknown, it was much less owing to the loss in 1912 of 679,461 square miles of area. The government is represented by a commissioner appointed by the Governor-General of Canada in council, and the administration is carried on by the officers of the Royal Northwest Mounted Police. Consult: Rufus Blanchard, *The Discovery and Conquest of the Northwest* (Chicago, 1880); E. T. Seton, *The Arctic Prairies* (New York, 1911); A. W. Tilby, *British North America, 1763–1867* (London, 1911); N. F. Black, *History of Saskatchewan and the Old North-West* (Regina, Saskatchewan, 1913); G. M. Douglas, *Lands Forlorn* (New York, 1914); and *Reports on the Northwest Territories* (Ottawa, Canada).

NORTHWEST TERRITORY. In American history, that portion of the national domain lying, roughly speaking, north of the Ohio River, east of the Mississippi, south of the Great Lakes, and west of Pennsylvania, and embracing territory which constitutes the present States of Ohio, Indiana, Illinois, Michigan, Wisconsin, and part of Minnesota—a total area of about 265,878 square miles. This territory passed into the possession of Great Britain by the Treaty of Paris in 1763, and by her was ceded to the United States of America in 1783. The greater part of it was claimed on the basis of their early charters, by Virginia, New York, Massachusetts, and Connecticut. The other States refused to recognize these claims, and insisted that this territory should belong to the country as a whole. In 1780 Congress gave a solemn pledge that if the lands thus claimed were ceded to the Confederation, they should be disposed of for the common benefit of all the States and admitted into the Union as republican States and on an equal footing with the original States. On the strength of this pledge New York ceded her claims in 1781, Virginia hers in 1784, Massachusetts hers in 1785, and Connecticut hers in 1786. All of these colonies, however, reserved for special purposes certain lands from the cession. Thus, Virginia retained in what is now the southern part of Ohio a considerable area, known as the Virginia Military District, and Connecticut retained 3,250,000 acres, known as the Western Reserve (q.v.), in what is now the northern part of Ohio. By an Ordinance of 1785 Congress made provision for surveying the lands thus ceded. The lands were then thrown open for sale, and the result was a great influx of immigrants from the older States. On the first of March, 1784, the very day on which Virginia completed her cession, Jefferson, as chairman of a committee, reported to Congress a temporary plan of government which was adopted on April 23. Jefferson's scheme contemplated the division of the territory into new States, divided by lines of latitude two degrees apart, and intersected by two



DOMINION OF

CANADA

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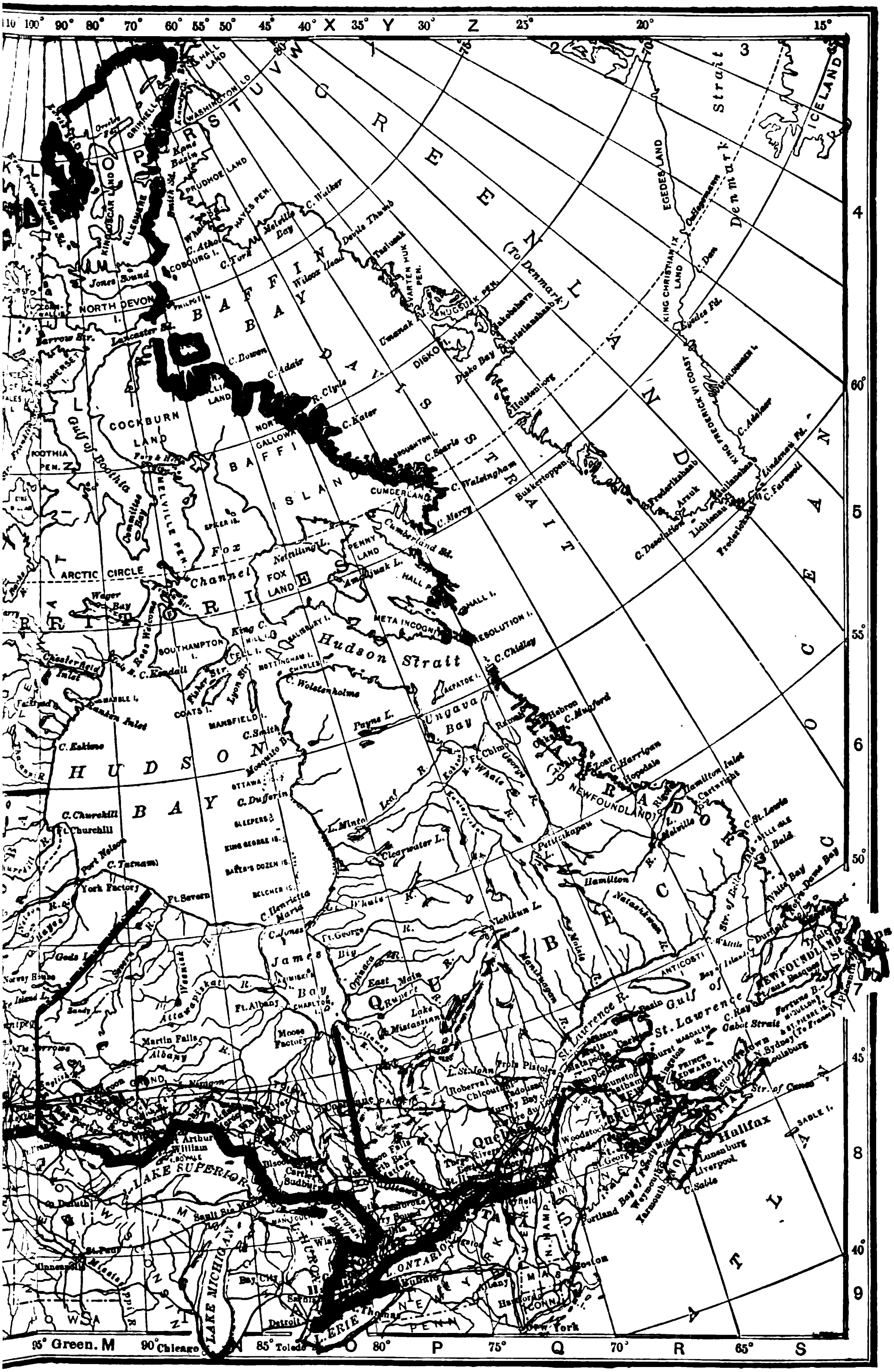

GREENLAND
Denmark Strait
ICELAND
EGEDES LAND
KING CHRISTIAN IX LAND
KING FREDERICK VI COAST
BAFFIN BAY
DAVIS STRAIT
BAFFIN ISLAND
COCKBURN LAND
NORTH DEVON
Jones Sound
Lancaster Sd.
Barrow Str.
Gulf of Boothia
BOOTHIA PEN.
MELVILLE PEN.
Fox Channel
FOX LAND
ARCTIC CIRCLE
SOUTHAMPTON I.
Hudson Strait
Ungava Bay
HUDSON BAY
James Bay
LABRADOR
NEWFOUNDLAND
QUEBEC
Gulf of St. Lawrence
ANTICOSTI
Cabot Strait
Halifax
Quebec
LAKE SUPERIOR
LAKE MICHIGAN
L. HURON
L. ONTARIO
L. ERIE
Chicago
Toledo
Detroit
Buffalo
Boston
New York
ATLANTIC OCEAN
C. Farewell
C. Chidley
C. Churchill
Ft. Churchill
York Factory
Moose Factory
Hamilton Inlet
Chesterfield Inlet
Wager Bay
HALL LAND
GRINNELL LAND
ELLESMERE
WASHINGTON LD.
PRUDHOE LAND
Kane Basin
Smith Sd.
DISKO I.
Disko Bay
Cumberland Sd.
RESOLUTION I.
METAINCOGNITA
Payne L.
Clearwater L.
L. Mistassini
St. Lawrence R.
Str. of Belle Isle
Notre Dame Bay
Sydney
Louisburg
SABLE I.
C. Sable
Bay of Fundy
ARCTIC CIRCLE
110 100° 90° 80° 70° 60° 55° 50° 45° 40° X 35° Y 30° Z 25° 20° 15°
95° Green. M 90° N 85° O 80° P 75° Q 70° R 65° S
1 2 3 4 5 6 7 8 9
60° 55° 50° 45° 40°

meridians of longitude to be drawn through the mouth of the Kanawha and the falls of the Ohio, and to the new States thus created were to be given the names of Sylvania, Michigania, Cheronesus, Assenisipia, Metropotamia, Illinoia, Saratoga, Washington, Polypotamia, and Pelisipia. These names were soon dropped, although they persisted for some time on the maps. The ordinance further provided that after the year 1800 neither slavery nor involuntary servitude should exist in any of the said States except as a punishment for crime. This ordinance never went into effect, and was repealed by the celebrated Ordinance of 1787. The Ordinance of 1784, however, is the basis on which the American plan of colonization was founded. This latter ordinance was prepared by a committee of which Nathan Dane, of Massachusetts, was chairman, and received the approval of Congress, July 13, 1787. It was a constitution of government for the Northwest Territory, and contained, besides, six articles of compact between the old States and the new States to be created out of the said territory. It provided that there should be formed out of the territory in question not less than three nor more than five States, and undertook to define their boundaries. For the purposes of temporary government this vast domain was constituted into one district, and was committed to the rule of a governor, a secretary, and three judges, all appointed by Congress. Until the election of a legislature, the Governor and the judges sitting together were authorized to adopt such laws of the original States as they deemed necessary and suitable, subject to the approval of Congress. Provision was made for a legislature to be called into existence as soon as there were 5000 free male inhabitants of full age in the territory. It was to consist of a Legislative Council composed of five members chosen by Congress and a House of Representatives chosen by freeholders. There were also a number of organic provisions regarding land tenure, taxation, inheritances, and the alienation of property. The articles of compact constituted a sort of bill of rights and guaranteed freedom of religious worship and belief, the privilege of the writ of habeas corpus, trial by jury, benefit of the common law, the security of private contracts, and freedom of navigable waters. Finally the Northwest Territory was dedicated to freedom by the famous article that prohibited slavery and involuntary servitude. In October, 1787, Gen. Arthur St. Clair, a veteran of the French and Revolutionary wars, was appointed the first Governor of the Territory. In July of the following year he reached Marietta, the seat of government for the Territory, and his first act was an order for the creation of Washington County. Shortly thereafter he appointed a number of magistrates and established a Court of Quarter Sessions. In 1798, the population having far exceeded the required number, a legislature was called and met for the first time at Cincinnati, Sept. 24, 1799. The Lower House consisted of 22 members, representing the nine counties of the Territory. In July, 1800, the western part of the Territory was constituted into the District of Indiana, with William Henry Harrison as Governor and with Vincennes as capital. In January, 1805, Michigan Territory was created, with Gen. William Hull as Governor; in February, 1809, the Illinois Territory was organized, with Kaskaskia as its seat of government, and in April, 1836, part of Michigan Territory was organized into the Territory of Wisconsin. Consult: Adams, "Maryland's Influence on Land Cessions to the United States" in Johns Hopkins *University Studies*, 3d series (Baltimore, 1885); Barrett, "Evolution of the Ordinance of 1787," in *University of Nebraska Papers* (Lincoln, 1891); B. A. Hinsdale, *The Old Northwest: The Beginnings of our Colonial System* (New York, 1899); Charles Moore, *The Northwest under Three Flags* (ib., 1900); D. G. McCarty, *Territorial Governors of the Old Northwest* (Iowa City, 1910).

NORTHWICH, nôrth'wĭch. A market town and urban district in Cheshire, England, at the confluence of the Weaver and Dane, 16 miles east-northeast of Chester (Map: England, D 3). It is noted for its salt mines, brine springs, and supplemental industries. The town has an ancient and dilapidated appearance, owing to cave-ins caused by the mining and brine pumping. The annual product amounts to about 1,500,000 tons. The Marston mine, 300 feet deep, its vault supported by enormous salt pillars, is very picturesque. Besides the church of St. Helen (seventeenth century), Northwich has a public library, technical schools, gymnasium, and park, and owns remunerative markets, water works, and public baths, which include medicinal brine baths. The brine springs have been worked from prehistoric times. Manufactures include bricks, iron, brass, chemicals, leather, and beer. During the Civil War Northwich was fortified by Parliament and was the scene of exciting encounters. Pop., 1901, 17,611; 1911, 18,151.

NORTH YAK'IMA. A city and the county seat of Yakima Co., Wash., 157 miles southeast of Seattle, on the Northern Pacific, the Yakima Valley Traction, and the Oregon-Washington Railroad and Navigation Company systems (Map: Washington, E 4). Noteworthy features include the St. Elizabeth Hospital, Carnegie Library, and fine Federal and high-school buildings. North Yakima is situated in a rich fruit district, and there are live-stock and dairying interests, lumber yards, fruit canneries, etc. The city has adopted the commission form of government. Pop., 1900, 3154; 1910, 14,082.

NOR'TON. A town in Bristol Co., Mass., 30 miles south of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 5). It is the seat of Wheaton College, for women, and contains a public library. There are bleaching works, wool-combing plant, and manufactories of jewelry and boxes. Pop., 1900, 1826; 1910, 2544.

NORTON, ANDREWS (1786–1852). An American theologian and scholar, the father of Charles Eliot Norton. He was born at Hingham, Mass., and graduated from Harvard College in 1804. He studied theology and in 1809 became a tutor in Bowdoin College. He went to Harvard in 1811 to teach mathematics, but resigned the next year to conduct the *General Repository*, a magazine devoted to the propagation of liberal Christianity. In 1813 he was made librarian of Harvard, in addition to which he was appointed lecturer on the criticism and interpretation of the Bible. From 1819 to 1830 he was Dexter professor of sacred literature in the Harvard Divinity School. The remainder of his life was devoted to literary pursuits. His first work of importance was *A Statement of Reasons for not Believing the Doctrine of Trinitarians Concerning the Nature of God and the Person of Christ*

(1833; new ed. with memoir by W. Newell, 1856; 11th ed., 1876). In 1833 he became associated with Charles Folsom in the publication of the *Select Journal of Foreign Periodical Literature* (4 vols., 1833–34). Other works of importance were *Evidences of the Genuineness of the Gospels* (1837–44) and *On the Latest Form of Infidelity* (1839). Specimens of his verse may be seen in Griswold's *Poets and Poetry of America* (Philadelphia, 1842).

NORTON, Caroline Elizabeth Sarah (1808–77), known as the Hon. Mrs. Norton and afterward as Lady Stirling-Maxwell. A British author, born in London. Her father was Thomas Sheridan and her grandfather Richard Brinsley Sheridan (q.v.). Her talent developed at an early age, and when only 13 she wrote *The Dandies' Rout*. Her *Sorrows of Rosalie: A Tale, with Other Poems*, appeared in 1829, two years after her unfortunate marriage to an impecunious barrister, the Hon. George Chapple Norton, whom she virtually supported for many years. Her marital troubles led her to publish a pamphlet on *English Laws for Women in the Nineteenth Century*, which, together with some other writings, undoubtedly had considerable influence in causing those laws to be changed. She was the author of three novels, but her reputation rests chiefly upon her poems, most of which were written in the style of Byron, though a few, like "The Faded Flower" and "Joe Steel," show that she could have written equally well in quite a different vein had she so chosen. After the death of Norton she married (1877) Sir William Stirling-Maxwell (q.v.). Among her other works are *A Voice from the Factories* (1836) and *The Child of the Islands* (1845). It has been generally supposed that Meredith drew from Mrs. Norton his inspiration for the central figure of *Diana of the Crossways*.

NORTON, Charles Eliot (1827–1908). An American scholar and biographer, son of Andrews Norton and a cousin of Charles W. Eliot (qq.v.). He was born at Cambridge, Mass., Nov. 16, 1827, graduated from Harvard in 1846, and began his career in a business house in Boston engaged in the India trade. In 1849 he went as supercargo on an East Indian voyage; subsequently he made several trips to Europe. During the Civil War he was editor of the Loyal Publication Society papers, and from 1864 to 1868 was editor, with James Russell Lowell, of the *North American Review*. Appointed professor of the history of art at Harvard in 1875, Norton held this post till his retirement in 1898. The Dante Society, of which Longfellow, Lowell, and he himself were presidents, he helped to found in 1881; from 1879 to 1890 he was the first president of the Archæological Institute of America, and he held membership in the American Academy of Arts and Letters. His university duties and the editing of the letters and literary memorials of distinguished men of letters at home and abroad who had been his friends filled his time from 1882 until his death, Oct. 21, 1908, at Cambridge. He was honored with several degrees—Litt.D. from Cambridge in 1884, L.H.D. from Columbia in 1885, LL.D. from Harvard in 1887 and from Yale in 1901, D.C.L. from Oxford in 1900. Charles Eliot Norton came to stand, more than any other American, perhaps, for the finer ideals of culture, and was in consequence often misjudged for utterances which seemed unpatriotic but were really inspired by a desire to promote the higher interests of his fellow citizens. His personality, finely embodying his own philosophy of life, was a potent influence in the America of his generation, and it is probably by this personal influence, rather than by the work of his pen, that he will be longest remembered. His books include: *Considerations on Some Recent Social Theories* (1853); *The New Life of Dante* (1859, an essay with translations; complete translation in 1867); *Notes of Travel and Study in Italy* (1860); *Chauncey Wright: Philosophical Discussions, with a Biographical Sketch of the Author* (1877); *Historical Study of Church-Building in the Middle Ages* (1880); *The Divine Comedy of Dante* (1891–92), a very helpful prose translation; *The Poet Gray as a Naturalist* (1903); *Longfellow* (1907). *A History of Ancient Art* (1891), based on lectures by Professor Norton, was prepared by Brown and Wiggin. His editorial work includes: *The Correspondence of Carlyle and Emerson* (1883); *Carlyle's Letters and Reminiscences* (1886–88); *Orations and Addresses of George William Curtis* (1894); *Letters of James Russell Lowell* (1894); *Letters of Ruskin to C. E. Norton* (1904). Consult: Emerson and Harris, *C. E. Norton* (Boston, 1912), and *Letters of Charles Eliot Norton, with Biographical Comment*, by his daughter Sara Norton and M. A. De Wolfe Howe (2 vols., ib., 1913).

NORTON, Richard (1872–). An American classical scholar, born at Dresden, Germany, a son of Charles Eliot Norton. He graduated from Harvard in 1892, and then studied in Germany and at the American School of Classical Studies in Athens. From 1899 to 1907 he was director of the American School of Classical Studies at Rome. Norton traveled much, especially in Asia Minor and in Africa, in Cyrene (q.v.) and its neighborhood. At Cyrene in 1910–11 he was director of the excavations made under the auspices of the Archæological Institute of America. Early in the European War (1914 et seq.) he organized and became commander of the American Volunteer Motor Ambulance Corps. He published also an important book, *Bernini and other Studies in the History of Art* (1914).

NORTON, Thomas (1532–84). An English lawyer and poet, born in London. When a boy he became amanuensis to the Protector Somerset, and at the age of 18 published a translation of the "Letter which Peter Martyr wrote to the Duke of Somerset," a valuable document, as the original is lost. He was afterward counsel for the Stationers' Company (1562) and solicitor to the Merchant Tailors' Company (1581). Entering Parliament in 1558, he was soon known as a bold and eloquent debater. He took an active part against the Catholics, and as licenser of the press was engaged in several most cruel tortures. Because of expressed dissatisfaction with the episcopacy he was imprisoned for a short time in the Tower on a charge of treason. Norton wrote much verse in English and Latin, but he is best remembered for his share in *Gorboduc* (q.v.). The first three acts were written by Norton; the last two by Thomas Sackville (q.v.).

NORTON, Thomas Herbert (1851–). An American consul and chemist, born at Rushford, N. Y. He graduated at Hamilton College in 1873 and at the University of Heidelberg (Ph.D.) in 1875; was manager in a large chemical factory in Paris, and helped to edit *Nature* and the *Chemical News*. During vacations he traveled widely, especially in Greece and Asia Minor. In 1883 Norton was chosen professor of chemistry and librarian in the University of Cincinnati. He established the American consulate at Kharput, Turkey (1900), and became consul at Smyrna (1905) and at Chemnitz, Saxony (1906). Special reports on the chemical industries of Europe were prepared by Norton for the United States Department of Commerce and Labor in 1911-12.

NORTON SOUND. An arm of Bering Sea, on the west coast of Alaska, south of Cape Prince of Wales (Map: Alaska, E 4). It is 175 miles wide at its entrance, extends about 125 miles into Alaska, and receives the waters of the Yukon River on its south shore. It is ice-bound from October to June. Norton Sound was discovered by Captain Cook in 1778.

NOR'UMBE'GA. A name given by early explorers and map makers to various portions of the eastern coast of North America and also to a river and a mythical city. Upon the map of Verrazano's voyages, published 1529, Aranbega appears as a place on the New England coast. The narrative of the anonymous "Dieppe Captain," in 1539, makes Norumbega stretch from Cape Breton to Florida. Mercator's map of 1541 apparently locates Anorumbega around the Hudson River, and that of 1569 represents Norombega as a city with high towers. Jean Allefonsce, the pilot of the Cartier-Roberval expedition (1541-44), speaks of a great river, brackish 40 leagues from its mouth, rocky, and filled with islands. This has been variously identified as the Hudson, Long Island Sound, and the Penobscot. Gastaldi's map, in 1556, makes Nurumbega the region near Cape Breton, while Thevet, in the same year, apparently makes the Norumbega the Hudson. David Ingram, a sailor, claimed that in 1568 he was put ashore on the Gulf of Mexico by Sir John Hawkins and made his way by Indian trails to the St. Johns River in Canada in 1569. While passing through Norumbega on his route he visited a city three-fourths of a mile through, the houses of which had pillars of crystal and silver. He saw a peck of pearls and rubies 6 inches long, while all the inhabitants had heavy ornaments of gold, and the richest furs were plentiful. This story was printed by Hakluyt in his *Principall Navigations* (1589), but Sir Humphrey Gilbert secured a copy before, and in 1583 set out to explore the country. With him he carried the poet Parmenius to sing the praises of the country. Michael Lok's map, in 1582, represents the Penobscot as a strait reaching to the St. Lawrence, and makes Norombega the country included between the two. Other maps of the sixteenth century locate the country in New England and indicate a city about the forty-third degree. Champlain, in his explorations of the Maine coast (1604-06), searched for the city, and ascended the Penobscot to the site of the present city of Bangor, but found no trace. The name begins to disappear in the seventeenth century; but John Smith, in 1620, applies it to New England and the coast down to Virginia, while Lucini, an Italian engraver, represents it as alternative with Nova Anglia in 1647. Heylin, in 1669, still dreams of a wonderful city.

The etymology of the word Norumbega is vague and uncertain. Grotius first indentified the term with Norbergia and suggested a Norse origin. Prof. E. N. Horsford derives it from *Norvegr*, Norway, and identifies the river with the Charles. He claims to have discovered ruins of a Norse city, subsequently occupied by Breton French, near Watertown, Mass., and in 1889 he erected a memorial tower at the junction of Stony Brook and the Charles. An Indian origin meaning "still water," or "place of a great city," has been suggested, while others call attention to the Spanish *vagas*, or *bagas* (fields). Weise, in his *Discoveries of America to 1525* (New York, 1884), derives the name from the Old French *l'anormée berge* (the grand scarp). Fiske also identifies the Hudson as the Norumbega River and locates a French city on Manhattan Island.

Consult: Beauvois, *La Norambegue* (Brussels, 1880); Justin Winsor, *Narrative and Critical History of America*, vols. iii-iv (Boston, 1884); E. B. Horsford, *Defenses of Norumbega* (ib., 1891); John Fiske, *Dutch and Quaker Colonies in America*, vol. vi (ib., 1899); P. De Roo, *History of America before Columbus* (2 vols., New York, 1900).

NORVAL, nôr'val. The son of Lady Randolph and her first husband in Home's tragedy *Douglas*. The part was played by both Kemble and Macready.

NORWALK, nôr'wąk. A city in Fairfield Co., Conn., 14 miles west by south of Bridgeport, on the Norwalk River, near Long Island Sound, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, B 5). It is a popular residential place as well as a summer resort. Its more prominent buildings include the Carnegie Library, Norwalk Hospital, Fairfield County Children's Home, and the State Armory. There are extensive manufactures of hats, corsets, shirts, shoes, cassimeres, felt goods, silks, underwear, locks, air compressors, etc. The oyster interests also are important, and considerable coastwise trade is carried on. The New York and Norwalk steamboat line maintains regular service to New York. Pop., 1900, 19,932; 1910, 24,211; 1914 (U. S. est.), 26,033. Norwalk was settled in 1649 and incorporated as a town in 1651. It formerly embraced the cities of South Norwalk and Norwalk, but in 1913 these were consolidated with East and West Norwalk, Winnepauk, and Rowayton to form the present city of Norwalk. On Nov. 11, 1779, Norwalk was burned by a British and Hessian force under Generals Tryon and Garth. Consult Byington, "Ancient and Modern Norwalk," in the *Connecticut Quarterly*, vol. i (Hartford, 1895), and C. M. Selleck, *Norwalk* (Norwalk, 1896).

NORWALK. A city and the county seat of Huron Co., Ohio, 56 miles west by south of Cleveland, on the Lake Shore and Michigan Southern, the Lake Shore Electric, and the Wheeling and Lake Erie railroads (Map: Ohio, E 3). It is a city of fine residences, and has a handsome courthouse and jail, and a public library. Norwalk is well situated for a commercial centre in an agricultural and stock-raising country; its extensive industrial interests are represented by piano works, pickling works, manufactories of interior decorations, curtain poles, novelties, umbrellas, tobacco, automobile accessories, etc., and by a printing and publishing house. Settled in 1817, Norwalk was incorporated first in 1828, and in 1881 received a city charter. The water works are owned by the city. Huron County is the westernmost of the 10 counties in northern Ohio composing the

Connecticut Reserve, or Western Reserve, part of which was granted to Revolutionary sufferers. Pop., 1900, 7074; 1910, 7858.

NORWAY, nôr'wā (AS. *Norwæg, Norþweg*, Icel. *Noregr, Norvegr*, Norw., Dan., Swed. *Norge*, Ger. *Norwegen*, Fr. *Norvège*, ML. *Norvegia, Northwagia*, north way). A long, narrow coast country of Europe on the North Atlantic, constituting with Sweden the Scandinavian peninsula. The length of the coast around the outer belt of rocks is 1700 miles, the entire shore line, including the fiords and the large islands, being about 12,000 miles, long enough to stretch half around the globe. The country extends from lat. 57° 58′ to 71° 11′ N. Its width in the south is about 250 miles, in the northern half about 60 miles, and in Finmarken, the extreme north, a little greater. The area is 124,129 square miles—a little more than that of New Mexico. The north coast is washed by the Arctic Ocean; Norwegian sealers sail every year as far north as it is open. On the south the Skagerrak, connecting the North Sea with the Cattegat, separates Norway from Jutland. Towards the east Norway has a land frontier 1500 miles long, being bordered by the Russian Government of Archangel for about 100 miles, by Finland for nearly 500 miles, and by Sweden for 950 miles. The east boundary extends most of the way in the midst of a belt of desolate plateau land through which the boundary with Russia was defined only in 1826 and with Sweden in 1751. Complete land connections have been made by means of railroads across the peninsula—at the head of the Gulf of Bothnia, at Trondhjem, and by a number of lines in the south. Two-thirds of the people live in the south.

Topography. The coasts are remarkable as a region of fiords. The shore line is everywhere broken by deep incisions of the sea into the rocky cliffs. Traces of the glacial period are found all over the land, and the fiords are ascribed to the overdeepening by glaciers of preglacial river beds, while the numerous islands fronting the shore are remnants of a former greater extent of the land eroded by ice which covered the highest peaks. Norway as a whole is a rugged plateau, with deep-cut valleys, the whole surface greatly denuded, peaks and groups of peaks rising, here and there, above the general level of the more plainlike region of the east. In the west, near the sea, are very ancient mountains worn down and rounded by denudation, and chiefly composed of hard igneous rocks that have better withstood the destructive forces which leveled the eastern districts to a plain.

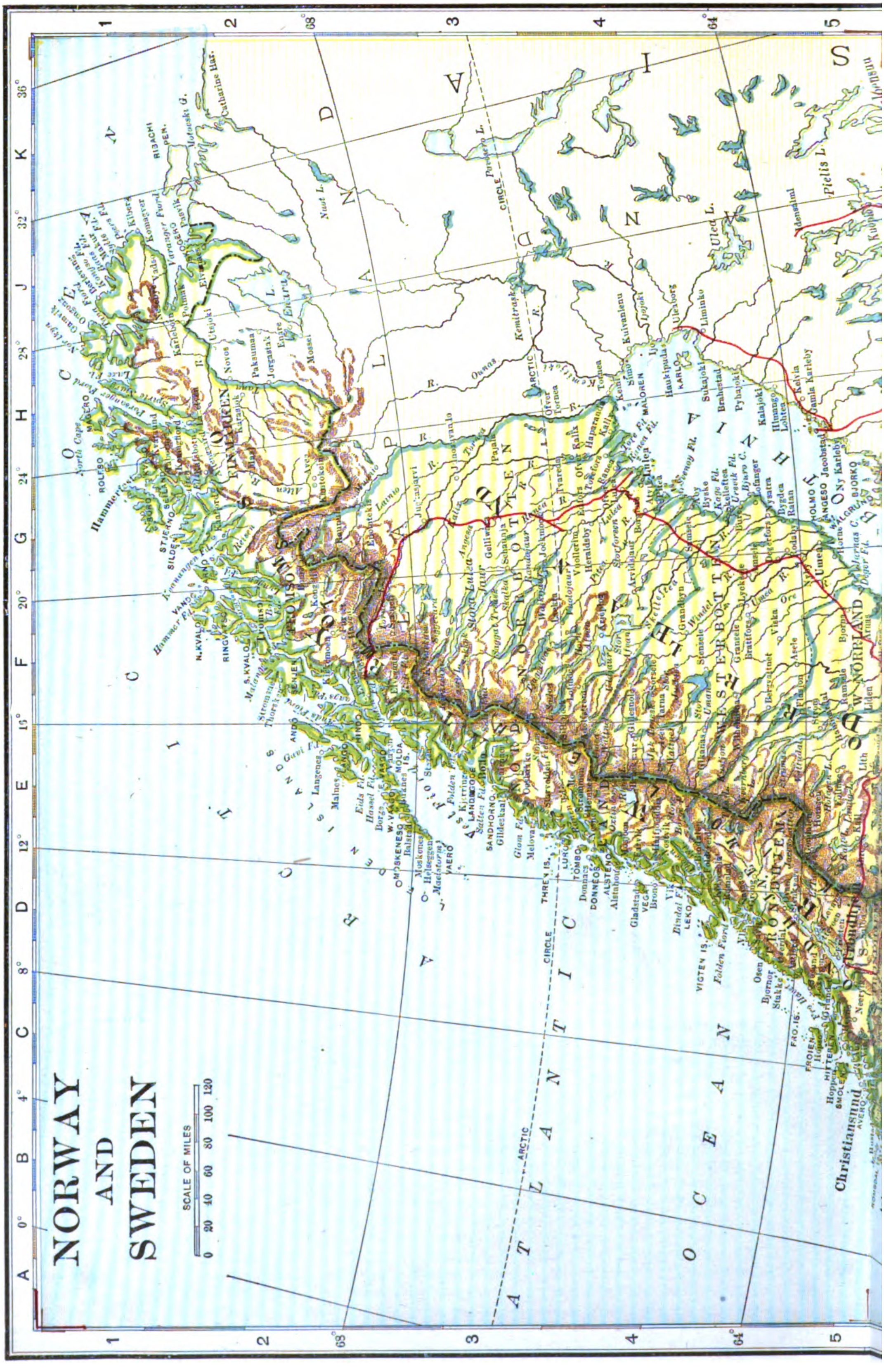
In the southeast and the middle north (mainly north of Trondhjem) is the woodland rising to an average height of from 300 to 1500 feet, with forest-clad hillsides from which Norway's lumber is derived. Between these and extending to the southwest the highest plateau of Norway stands. In the Jötunheim, Glittertind attains 8380 feet, Galdhöpiggen 8400, and Store Skagastölstind 7861 feet. In the far north the mountains, rising directly from the sea, attain a height of 6000 feet. There are three distinct mountain ranges—Kjölen, between Norway and Sweden, Dovrefjeld, and Langfjeldene.

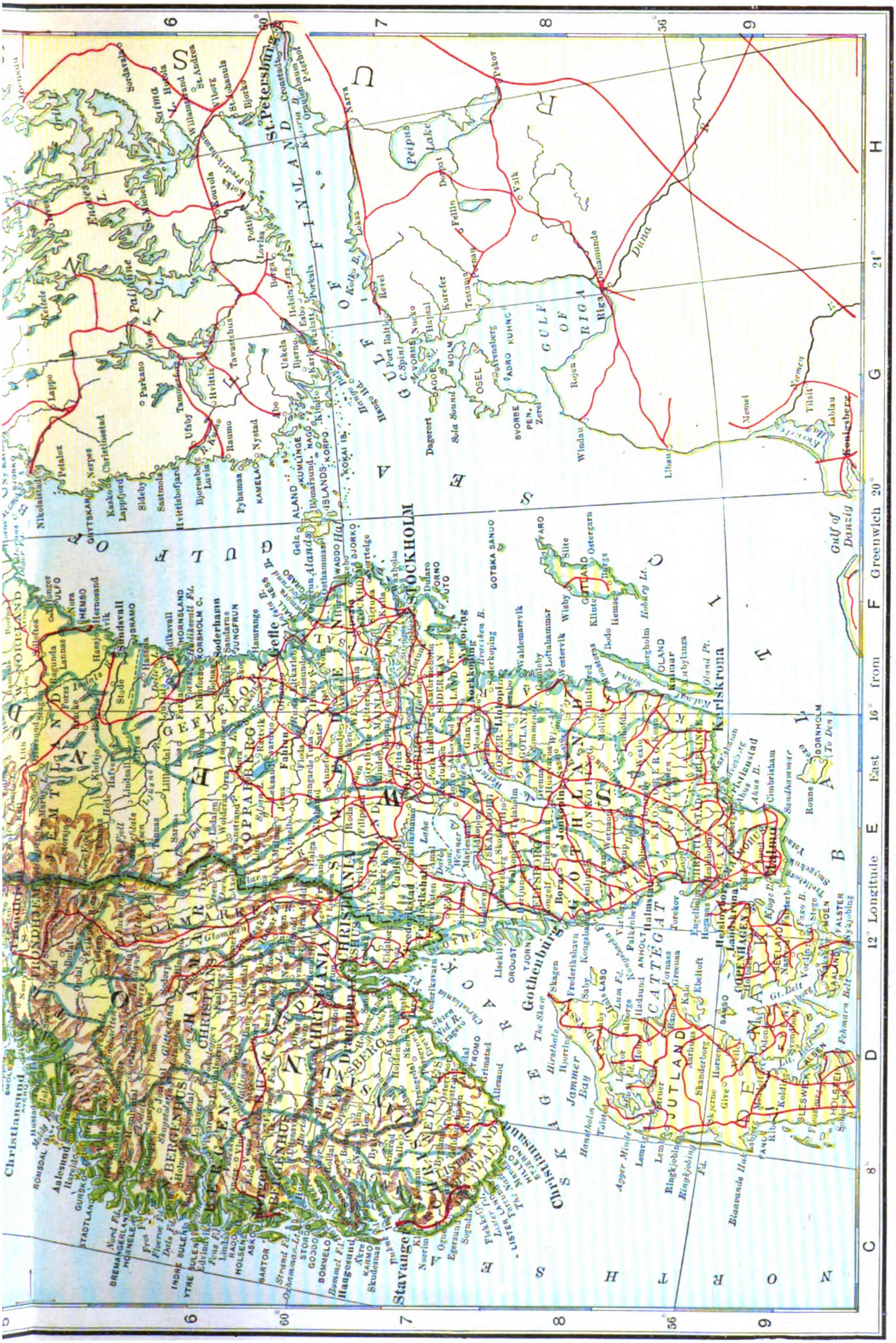
Hydrography. The height axis is not far from the west coast, and the western rivers therefore are short, although their volume of water is large on account of the heavy rainfall. The eastern rivers flow along fairly regular parallel valleys, which are open and flat in the mountains, but are cut deep through the plateau. A few of the eastern fluvial basins are large, that of the Glommen being 16,000 square miles, that of the Drammen 6600 square miles, and that of the Skien 4250 square miles, but the volume of water is comparatively small on account of the smaller rainfall. The slope is great and the rivers are filled with falls and rapids, which impart great beauty but prevent navigation. The mountain highland and woodland are dotted with an enormous number of lakes, most of them narrow and long, owing to the intense action of glaciers. The proportion of Europe occupied by lakes and rivers is only 0.5 per cent of the area, but the percentage in Norway is 4. Most of the larger lakes are found in the long valleys—the largest of them, Mjösen (140 square miles, 60 miles long, 1500 feet deep), Randsfiord, Spirilen, Kröderen, and others, lying at a height of about 400 feet above the sea just outside the border of the highland in the east country.

Climate. Norway reaches 300 miles into the Arctic zone, and nearly a third of the country is in the domain of the midnight sun and winter darkness, but even in the extreme south the summer day is long, but the winter day is short. At Christiania, in the far south, the sun is above the horizon on the shortest day less than six hours. The west coast is warmer than the interior because it has the full effect of the westerly winds, whose temperature is modified by blowing from the temperate waters of the Atlantic. The fiords do not freeze, largely owing to three factors—the depth, the continual movement of the waters, and the westerly winds, which cause the drift—and are navigable the year round. The land, rising from the coast into mountain tops and plateaus, in places rises into regions of perpetual snow where glaciers descend into the valleys. The line of perpetual snow, at the parallel of 62° N., is between 4500 and 5000 feet above the sea; at 66° 30′ the snow line falls to 3900 feet, and at 70° to about 3000 feet.

The climate varies in different parts of the country. Southeast Norway, limited on the north by the Dovrefjeld, has a mean annual temperature varying from 44° F. to 31° F. July is the warmest month, with a mean temperature of 61° F. at Christiania. The winter is most severe in the heart of the country. At Christiania the mean winter temperature is 25° F. The temperature of west Norway is fairly uniform, the mean annual temperature being highest (44° F. to 45° F.) at the extreme western ends of the land. The annual rainfall is greatest along the west coast, where winter rain and fog are common, ranging from 50 to over 80 inches. On the southeast coast, near Grimstad, it is 48 inches, while on the Dovrefjeld it is only 12 inches. Snow is less frequent in the west than in the east on account of the milder winter temperature. The country north of the Dovrefjeld is colder than in the south, but the climate of the coast region is also modified by oceanic influences. The most varied shades of continental and maritime climates are thus represented in Norway. The inland districts of southeast Norway and Kinmarken, with their severe winters and relatively high summer temperature, their gentle breezes and small rainfall, are examples of typical inland climate. The whole coast line, with mild winters, cool summers, abundant rainfall, and unsettled weather,

NORWAY AND SWEDEN

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Viborg
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Libau
Memel
Tilsit
Konigsberg
Gulf of Danzig
Stockholm
Upsala
Gefle
Sundsvall
Hernosand
Aland Is.
Gotland
Wisby
Oland
Karlskrona
Bornholm
Malmo
Helsingborg
Gothenburg
Christiania
Drammen
Christiansand
Stavanger
Bergen
Trondhjem
Christiansund
Aalesund
Skager Rack
Cattegat
Jutland
Copenhagen
Sealand
Fyen
Odense
Aarhus
Aalborg
Skagen
The Skaw
Jammer Bay
Gleswick
Holstein
North Sea
Baltic Sea
Norrland
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is an example of typical maritime climate. On the whole, the climatic conditions are favorable to the development of a strong, healthy, energetic people.

Flora. The richest vegetation is found in the southeast around Christiania Fiord and the large lakes. Considering its northerly position, Norway has a luxuriant vegetation. About 1500 species of phanerogams alone grow wild. In the southeast conifers form thick forests from sea level to 3000 feet. Up to about 1600 feet above the sea level a luxuriant growth of oak, ash, lime, maple, elm, and lowland birch is found, secondary to the conifers, but giving its characteristic stamp to the lowland flora. Above the limit of conifers is the birch zone, reaching 3500 feet above the sea, where the true mountain plants begin to be prominent. Above the birch limit the willow and the lichen zones are distinguished. In the willow zone there are no trees—only a dense growth of low bushes. Reindeer moss predominates in the lichen zone. About 21.5 per cent of the land is in forest, and of this about 75 per cent, is under pine trees. The extreme coast region is destitute of forest and also of some continental plants found inland, but is especially rich in mosses. The arable soil is found in narrow strips of deep valleys and around fiords and lakes. Large continuous tracts fit for cultivation exist only in the southeast and near Trondhjem, and only $\frac{1}{10}$ of the total surface is in grain fields.

Fauna. The animal life is that of the rest of north Europe, with relics, chiefly in the north, of Arctic elements such as the mountain or Arctic fox, the ptarmigan, the snow bunting, and various insects. With its long coast line Norway is richer in species of fish than most northern lands, more than 200 species being found. There are a number of Arctic contributions, including the Greenland shark, which is fished for its liver. Very numerous are fishes which belong to the north or general European fauna, including most of the food fishes, such as cod, haddock, coalfish, pollack, torsk, herring, sprat, and mackerel. The salmon is caught along the coast and in the rivers where it comes to spawn. Trout and red char are the most widely distributed fresh-water fish. Of the 10 species of reptiles and amphibia, the lizard and the frog are found everywhere, but the viper has its northern limit at the polar circle. The birds number 280 species, of which 190 breed in the country. Most of them are birds of passage, as the falcon, geese, and ducks. The mild climate of the south and west coasts induces the starling, blackbird, woodcock, duck, swan, etc., to winter there. Along the west and north coasts are numerous colonies of swimming birds. The birds of the lowlands are similar to those of Europe in general. There are 67 mammals. The hedgehog is found in the south, the lynx in unfrequented forests, and the glutton, a great enemy of the reindeer, among the mountains of the north, where the reindeer grazes. Wolves, formerly numerous, have nearly disappeared, except in north Norway. Bears are gradually disappearing, and the commonest beast of prey is the fox among the mountains. The common seal and the gray seal breed on the Atlantic islands, and all the Arctic seals, and even the walrus, sometimes appear on the north coast. The lemming lives in the mountain wastes and sometimes overruns the lowlands, damaging crops. A few beavers remain, and the mountain hare, which turns white in winter, is found all over the country. The ruminants are represented only by the red deer, the elk, and the reindeer among wild animals. The wild reindeer is decreasing on account of overhunting, but many herds of tame reindeer are kept in the north and even among the mountain wastes of the south that lie too high for general grazing.

Geology and Mining. Archæan rocks penetrated frequently by gneisses and gabbros have a wide extension in Norway, particularly through the mountain regions of the west and in the districts from Lake Mjösen southward. During Cambrian and Silurian time the open sea extended over the southeastern part of Norway, especially about Christiania Fiord and the lakes in its neighborhood, and on its bottom lime, mud, sand, and gravel were laid down, forming a series of strata rich in fossils and very thick. Cambrian and Silurian rocks are thus widely represented, particularly east of the mountains and north of Lake Mjösen, and also among the northern mountains behind the coastal areas of igneous rocks. A belt of Post-Silurian and Cambrian rocks extends from Lake Mjösen southward through the Christiania region to the south coast, forming the subsoil of that beautiful and undulating country. Over large areas of the ancient rocks are spread the deposits of the ice age to no great depth. Raised beaches along the outer parts of many fiords are proof of the former lower position of the land.

The mining industry is not important, for Norwegian ores are not rich nor large in extent. The Kongsberg silver mines, owned by the state, yielded 1111 tons of fine silver between 1623 and 1911, and the yearly production is eight tons of fine silver. The Röros copper mines, owned by a joint-stock company, yielded 80,000 tons of copper and 400,000 tons of pyrites between 1644 and 1911. In 1911 there were produced 38,263 tons of copper ore and 406,896 tons of pyrites, and the industry employed 3745 men. Iron ores occur in many places, but little is mined, and coal does not occur except on the remote island of Andö. At the end of 1911 there were about 40 mining establishments, employing 5987 workpeople, and 6 smelters, with 356 laborers. The chief mineral products of 1911 were silver, worth $147,453; copper ore, $358,713; pyrites, $2,091,153; and iron ore, $614,209. The total value of the mining in 1911 was $3,439,410, and of the product of the smelters $741,823. Fine marble, building stone, roofing slate, soapstone, and millstones are produced in large quantities and are important exports. In 1912 the stone industry employed 10,050 workers.

Fisheries. Fishing is among the oldest of the country's industries. The value of all the fisheries, including the Arctic fisheries and various extra sources of profit, such as oil and fish guano, is about $26,246,000 a year. The cod is the largest fishery, the number of persons engaged in it in 1912 being 94,281, with 20,000 boats, and the value of the catch $7,163,000. The largest centre of the industry is the Lofoten Islands, where, in the first few months of the year, about 40,000 men are engaged in fishing or in preparing the catch for market. The average per man for the whole of the fishing is from 900 to 1000 cod. The fish are sold partly to traders on the islands who have warehouses with salting and storing rooms, and partly to merchant vessels, which carry their purchases to other ports. The herring fisheries, next to the cod in importance, are carried on all along the coast, the summer fisheries employing over 27,000 men, and the value of the product being usually over $3,350,000. The catch in recent years is steadily improving. The mackerel is rare north of Trondhjem Fiord, and is fished chiefly in the Skagerrak and the fiords off it. The industry in 1911 employed 3420 men, the product being worth $737,292. The salmon, sea trout, lobsters, and oysters (small yield) also figure in the total product of the large fisheries. The mackerel is also caught in the North Sea, and the Arctic and Antarctic fisheries engage every season about 2000 men, who sail over the Arctic Sea from Greenland and Jan Mayen Island in the west to Spitzbergen and Finmarken in the east, to Africa, South America, Australia, Antarctic Ocean, St. Lawrence, Alaska, and Japan, for sealskins and oil, whale oil, and bearskins.

Agriculture. Of the total area, 59 per cent is bare mountain, 22 per cent woodland, and only 10 per cent is in pastures, hay lands, and fields. In the southeast cultivated plants and fruits ripen in the open air, but in the north and on the higher tracts there is little or no agriculture. Crop and cattle raising are usually carried on together. Oats is the chief grain, but none of the cereals suffices for the needs of the country. Barley and rye are grown much farther north than oats, but wheat is rarely found north of the Trondhjem Fiord. The area annually sown to wheat is about 10,000 acres, with a yield of about 255,000 bushels. Rye is the great bread cereal, its cultivation extending to the seventieth parallel, the area annually sown being about 34,000 acres and the yield about 700,000 bushels. Among root crops only potatoes are cultivated to a large extent, and they are one of the chief foods. The average production is about 18,000,000 bushels. The production in 1912 was 30,000,000 bushels. The yield of the different kinds of grain is large compared with that of most European countries, owing to careful cultivation and heavy manuring.

Live Stock. Norway has only about one-third of the cattle of Scandinavia, but the pastures give adequate grazing for most of the sheep. In 1910 there were in the country 176,402 horses, 1,139,079 cattle, 1,400,703 sheep, 288,351 goats, and 344,957 swine. In 1907 there were 142,643 reindeer.

Of the two types of horses, the small fiord horse is an excellent working animal in the mountain districts, where good roads are lacking. The larger Gudbrandsdal is quick and strong as a farm and carriage horse. The cattle of several different breeds are small, but good milkers. They often seek their food over large areas of sparse pastures. Attempts to improve them by an admixture of foreign blood have not been very successful. Most of the butter and cheese is made in coöperative dairies with the best equipment, and brings the highest price in the British market. Norwegian sheep are small, slender, and fine wooled. They have been crossed with foreign breeds to their advantage. The gross return of the live-stock industry annually averages about $37,520,000, which, added to the average return of $49,573,083 a year from the farm crops, gives a gross income from Norwegian husbandry of over $87,093,083 on an average. The buildings on Norwegian farms are comparatively expensive on account of the severity of the winter. Domestic animals require warm barns, and everything, including hay, must be placed under cover. The number of farms in 1906 was 245,994; in 1910, 304,395.

Forest Industries. Lumbering has always been one of the greatest industries. The large forests lie far from the inhabited districts as a rule, and the timber cutters and log drivers live in huts, most of them being strong and hardy single men. Three-fourths of the forests are pine lands, but the Norway pines and spruces convenient to Christiania and other shipping points have been depleted in many places, so that the more northern forests in Sweden are now the larger source of Scandinavian lumber. Norway's forest products, however, form about one-third of the country's total export. The value of the unwrought or only partly wrought timber exported from Norway in 1912 was $8,917,560, and of wrought timber (mostly wood pulp) $20,928,873.

Other Industries. About 78,060 persons are engaged in the manufacturing and other industries outside of those mentioned above. The production of lumber and woodenware is the oldest and largest branch, employing in 1912 20,782 workpeople. There are many saw and planing mills, chiefly along the rivers. The most important machine shops are in Christiania. Iron ships are built and there are carriage and car works. In machine production the country has not kept pace with her neighbors, and Norway has yet much to learn from other countries. The textile industries, spinning and weaving mills, jersey factories and roperies, employ about 11,512 persons, and number 178 establishments, most of them situated in the outskirts of the towns. Paper making derives its importance from the large resources of wood pulp. Small tanneries and flour mills are scattered all over the country. Breweries, tobacco and tinning works, are chiefly in the larger towns, and particularly in Christiania. Potteries, china factories, iron foundries, nail-rolling and wire mills, have a considerable output. Only about 8320 persons are employed in making articles of attire. As the country is deficient in industrial development, the imports of manufactures are large.

Commerce. The growth and average annual amount of Norway's trade may be seen from the following table:

	1896–1900	1901–05	1913
Imports..........	$75,348,600	$79,032,400	$148,022,000
Exports..........	43,278,800	50,937,000	102,084,000

The aggregate foreign commerce since the middle of the nineteenth century has more than quadrupled. The imports largely exceed the exports, but this difference is covered to a great extent by the profits from the shipping trade, as Norway is a great carrier of freight for foreign countries. Articles of food and drink are the largest imports. Nearly half the value of the imports is represented by cereals, rye being the chief item, with barley, wheat flour, rye flour, and wheat following. Groceries, particularly sugar and coffee, are large imports. Bacon and other meats are brought chiefly from the United States. Cotton and woolen goods and yarn are the chief textile purchases. Among the imports of raw material are coal, hides and skins, iron and steel, cotton, wool, and hemp. The country buys over 2,724,645 tons of coal every year. Oils, particularly kerosene, hempseed, and linseed, amount to about $5,729,758 a year. Steam engines, locomotives, metal goods, and vessels are also large imports. Timber and fishery products are the most important exports. About one-fourth of the timber is sent abroad as deals and boards. Some 767,995 tons of wood pulp are annually sold. The increased sales of the products of agriculture and cattle raising, which have quadrupled since 1871–75, are especially due to exports of butter and condensed milk. Among other important exports are packing paper, ships, ice, dressed stone, iron and steel nails, and metal and ores. The United Kingdom and Germany are most important in Norwegian commerce, the United Kingdom commanding about one-third and Germany one-fourth of the entire trade, while Sweden has less than a tenth. The sales to the United States are important and growing. Norway buys from the United States cotton, wheat, provisions, tools, machinery, locomotives, and leather goods to the value of several million dollars a year. The foreign commerce is carried on chiefly through the ports of Christiania, Bergen, and Trondhjem, the timber-trading towns of Fredrikstad and Drammen being also especially important. Christiansand, Stavanger, and Bergen are widely known for their export of salted and dried fish and canned fish.

Transportation and Communications. The Norwegians are a race of sailors. Their merchant marine is the third largest in the world, and in proportion to population it stands as number one. While the natural commerce is comparatively small, Norwegian vessels and sailors are conspicuous in the sea carriage of freight for foreign nations. A considerable number of their vessels are engaged in the fruit trade between the United States and Latin America. In 1912 the mercantile marine included 1106 sailing vessels (697,893 tons) and 2126 steamers and motor boats (1,985,242 tons), or a total of 3232 vessels with a tonnage of 2,683,135. The total length of railroads in 1912 was 1917 miles, of which the state railroads had a mileage of 1697. The length of telegraph and telephone wires in 1913 was 13,535 miles.

Banks. The right to issue paper money is reserved to the Bank of Norway (Norges Bank), a joint-stock bank owned in part by the state. The bank has charge of the money transactions of the state and does business as a loan, circulation, discount, and deposit institution. The head office is at Christiania, and it has 16 branch offices in the most important towns. The balance sheets for 1912 showed total assets of $38,790,480. The Mortgage Bank of the Kingdom of Norway (Kongeriget Norges Hypothekbank) makes loans on real estate. The capital of the bank is mostly supplied by the state and amounted in 1912 to $7,541,099; the loans on mortgages at the end of 1912, $51,470,821, of which about one-fourth had been granted on town and three-fourths on country property; the total amount of bonds issued was $57,034,658. There were 108 private joint-stock banks, with a paid-up capital of $13,534,342. The number of chartered savings banks in 1912 was 508, with 1,078,704 depositors and $125,310,348 deposits.

Government. From 1814 to 1905 Norway was united to Sweden under the same king, retaining its own government with a separate ministry and legislature. The law of succession to the crown was the same in both countries, and commissioners appointed by the two parliaments regulated the questions touching the transmission of the crown. Affairs common to the two governments were attended to by a Council of State composed of both Swedes and Norwegians. For the revolution of 1905, see *History* (p. 247). The form of government in Norway is fixed by the constitution or fundamental law of May 17, 1814. The Norwegian state is a constitutional monarchy with the parliamentary or responsible system of government. The legislative power is vested in a Parliament or Storthing, which, upon assembling, divides itself for legislative purposes into two chambers, the Odelsthing and the Lagthing. The former consists of three-fourths of the whole number of members chosen to the Parliament. The members, 123 in number, include representatives from the cities and from the country, all chosen for a period of three years and renewed integrally. All citizens, men and women, 25 years of age who have resided in the state for a period of five years are qualified to vote for members of the Storthing unless disqualified for special causes. To be eligible to membership in the Storthing one must be a citizen, man or woman, 30 years of age, and must have resided in Norway for a period of 10 years. Certain high state functionaries are disqualified. Till 1906 elections were indirect and in the second degree. A certain number of primary electors in the country chose one secondary elector; the secondary electors then assembled in the chief towns of the electoral district and chose a certain number from their own body to serve in the Storthing. By a Law of May, 1905, direct elections were established. The Storthing meets annually, but cannot remain in session for a longer period than three months without the authorization of the King. The King may call an extraordinary session of the Storthing and dissolve it, but he does not have power to dissolve the ordinary sessions and order new elections. The members receive a compensation of about $3 per day during the session.

After the separation of the Storthing into two chambers, each meets separately, chooses its own officers, and is the judge of the election and qualifications of its members. Bills are first presented to the Odelsthing by its own members or by the government, and after passage are sent to the Lagthing, which must either accept or reject them in toto. In case of a deadlock between the two chambers they come together in united session and deliberate and vote as a single assembly. The chief powers of the Storthing are to enact laws, impose taxes, raise loans, supervise the finances, vote appropriations, and approve treaties concluded with foreign powers. The Lagthing has the exclusive right of choosing the justices of the highest court, while to the Odelsthing belongs the right to inspect the public accounts and to prefer impeachments against public officials, including members of the Storthing. The members of the Lagthing, together with the justices of the Supreme Court, form a court (Rigsret) for the trial of ministers, members of the Storthing, and justices of the Supreme Court. The crown, which up to 1905 was vested in the descendants of the house of Bernadotte, occupying also the Swedish throne, was transferred as a result of the revolution of that year to a member of the royal house of Denmark in the person of Charles, the second son of the reigning King Frederick VIII, who assumed the proffered Norwegian crown as Haakon VII. To the King belongs the right of sanctioning laws passed by the Storthing. If, however, he withholds his sanction and the law is passed a third time by the Storthing, it becomes valid without the royal approval. The King is commander of the army and navy, may declare defensive war, make treaties, levy troops, etc. He is declared to be inviolable and irresponsible. He exercises his authority through a Council of State composed of a Minister and eight Councilors of State appointed by himself. The Minister and Councilors preside over the departments of administration and have access to the Storthing, where they are allowed to take part in the deliberations, but with no right to vote. The departments are as follows: Worship and Education, Justice, Interior, Public Works, Finance and Customs, Defense, Public Accounts.

The judicial system consists in the first place of a Supreme Court (Höiesteret), composed of a president and at least six other justices, elected by the Lagthing, and having a territorial jurisdiction embracing the whole Kingdom. There are also three superior courts (Stiftsoverretter), each consisting of a bench of three justices, one of whom bears the title of Chief Justice. For the administration of civil justice Norway is divided into 107 districts, each with an inferior court. There is also a court of mediation, so called, in each town and district, composed of two laymen, popularly elected, before whom, as a rule, civil cases must first be brought. According to the new code of criminal procedure, adopted in 1887, all criminal cases must be tried before a jury court (Lagmandsret) consisting of 3 judges and 10 jurors, or before the Meddomsret, a tribunal consisting of one professional judge and two lay assistants summoned for each case. The former has jurisdiction of the more important offenses, while the latter is a court of first instance for the trial of misdemeanors. For the purposes of local government, Norway is divided into 20 districts, in each of which is an executive officer called an amtmand. These districts embrace the two cities of Christiania and Bergen and 18 counties (amter). Smaller administrative divisions are the communes and wards. Each commune has a representative assembly (its size varying according to the population of the commune) and a smaller council, chosen by the representatives from their own body. They also elect triennially a chairman. All the chairmen of an amt form with the amtmand a sort of county diet, which meets annually under the presidency of the amtmand to fix the amt budget. The members of the local governing bodies are chosen by an electorate more narrow than that which chooses the members of the Storthing.

Finance. The budget for the year 1912–13 was: income, $43,076,538; expenditures, $41,020,274. A little over a third of the income is derived from the customs, and less than a sixth from the railroads. The other sources of income include the excise tax, stamps, income tax, post office, state telegraph, state mines, and other state property. The total debt in 1913 was $97,250,267. Gold is the standard of value. The crown (26⅘ cents) is the unit of coinage. The metric system of weights and measures is obligatory.

Army. Like that of Switzerland the army of Norway is a true militia, liability to service being universal and compulsory between the ages of 18 and 55. The country is divided into six territorial brigade districts, each of these into a number of regimental districts. Brigades vary in strength and are composed of all arms. The garrison artillery troops are not included in the brigade organization. The organization of the army in 1915 provided for a total of 62 battalions of infantry, 5 companies of cyclists, 3 regiments of cavalry (16 squadrons), 27 four-gun field batteries, 3 mountain batteries, 4 garrison artillery companies, and 1 regiment of engineers. Upon initial mobilization for war each brigade would consist of two or three regiments of infantry of four battalions each, three or four squadrons, a battalion of field artillery (either four or five batteries each), a sapper company, a telegraph company, a sanitary company, and a train company. Total strength of the field army in war, 80,000. *Service.*—Although liable at 18, recruits are not called to the colors until the age of 23. They belong to the active army for 12 years, to the landvärn, or first reserve, for 8 years, to the landstorm, or last reserve, for 12 years. The annual contingent is first sent to recruit schools where the men receive training as follows: infantry and garrison artillery, 48 days; mountain artillery, 62 days; engineers, 72 days; field artillery, 92 days; cavalry, 102 days. They then report for 24 days' training to the regular units to which permanently assigned. Subsequent to this the men are called out for repetition courses for 24 days in the second, third, and seventh years of the 12-year period of assignment to the active army. In each regimental district is organized an infantry battalion of six companies of landvärn reservists, the other arms forming landvärn units in the same proportion. These landvärn units, in war, bring the total strength up from 80,000 to about 110,000. *Arms.*—Infantry, Krag-Jörgensen rifle; field artillery, Erhardt rapid-fire 75-millimeter gun. *Military budget*, about $4,250,000 annually.

Navy. See NAVIES.

Population. By the census of 1910 the population was 2,392,698, or 18 to the square mile. Norway is thus the most thinly populated country in Europe. The population on Dec. 31, 1905, was 2,315,064. About two-thirds of the population live upon the coast and along the fiords;

DISTRICTS	Area, square miles	Population Dec. 1, 1910
Christiania (town)	6.4	243,801
Akershus	2,017	127,697
Smaalenene	1,600	152,455
Hedemarken	10,600	134,468
Kristians	9,785	119,081
Buskerud	5,721	123,663
Jarlsberg and Laurvik	896	189,124
Bratsberg	5,865	108,049
Nedenes	3,610	76,985
Lister and Mandal	2,805	82,551
Stavanger	3,532	141,064
Söndre Bergenhus	6,026	145,926
Bergen (town)	5	76,917
Nordre Bergenhus	7,136	89,972
Romsdal	5,788	144,736
Söndre Trondhjem	7,185	147,827
Nordre Trondhjem	8,696	84,993
Nordland	14,804	163,775
Tromsö	10,134	81,650
Finmarken	17,918	37,964
Total	124,122	2,392,698

about a fourth in the interior lowland districts; the remainder in the mountain districts. Three-fourths of the inhabitants dwell in the rural districts. Nearly all the sixty-two towns in Norway are small. The population of Christiania (the capital) and Bergen together is about half the town population of the country. A small proportion of the inhabitants are of foreign birth.

The list of the political districts, with areas and populations, is given on page 246.

Emigration. In the nineteenth century Norway lost by emigration to the United States and other countries a comparatively larger part of its population than any other country in Europe excepting Ireland. Most of them made their new homes in the northwestern United States. In 1913 there were 9984 emigrants.

Education. The Norwegian primary school has a seven years' course adapted for children between 7 and 14 years of age. Every child that does not receive an education equivalent to the primary course by its fifteenth year may be compelled to attend these elementary schools, which in 1910 numbered 5987 with 280,121 pupils in the country, and in the towns 3241 classes with 96,602 pupils. Secondary schools numbering 89, of which 24 are private, 14 public, 51 communal, give a higher course of instruction and had about 18,752 pupils in 1911. There are several technical, agricultural, and commercial schools. The Royal Frederick University in Christiania has 91 professors and 1600 students.

Religion. The Evangelical Lutheran creed is the state religion, and the church is called the Norwegian Established church, most of the inhabitants being members. All other religious bodies (except Jesuits) are tolerated. Norway is divided into six bishoprics, and each diocese into deaneries, which are again subdivided into livings, at present numbering 501. The total number of parishes is 984. The dissenters in 1910 numbered 62,553, including 2046 Roman Catholics, 10,986 Methodists, 7659 Baptists, 714 Mormons, and 143 Quakers.

The poor are provided for by local taxes, though the counties and the state assist. The number of persons receiving relief of any kind in 1910 was 79,770.

Ethnology. Since Neolithic times Norway has been mainly inhabited by tall, blond longheads, of Teutonic stock, who are believed to have come from the Caucasian steppes during the prehistoric migrations. Because of the great ice cap which lingered on the mountains, Norway was peopled much later than Sweden, which shows Paleolithic inhabitation, while the former has revealed only the Neolithic. There were three land bridges by which man may have come to the Scandinavian peninsula, one on the west joining the British Isles to Norway; the second from Rügen in north Germany to Scania in Sweden; and a third much later bridge from Finland to east Sweden. By the middle bridge Sweden and Norway received the red deer and the Teutonic longhead population, which is almost pure in the former country. Whatever Finnic elements are present may have come by the Bothnia bridge. On the west there came a dark, short type of probably Round Barrow or Pictish origin. It would seem that these people brought the Shetland pony. The longheads coming in from Sweden around the southwest coast lowlands occupied the interior of the country after the melting away of the ice cap. This region was never touched by that tremendous wave of migration of short, dark longheads called Mediterraneans by Sergi, coming, it is conjectured, originally from north Africa. Thus there has been forming here for a long period from these light and dark elements a virile race in an environment whose stress was a spur to the development of manly qualities for which the Norwegians have excelled since they came in the purview of history.

The Norwegians prefer a country life, but little of the modern movement towards cities being noticed until recently. They are of tall stature (5 feet 8 inches), with strong, well-knit frames and good muscular development. Fair skin, blue eyes, and light flaxen hair characterize the bulk of the population, but the dark type is often recognized. Among the children flaxen hair is almost universal, but with development the hair, eyes, and skin become darker in a majority of cases. As a people the Norwegians are remarkably hardy and show a preference for athletic sports which require great endurance. For this reason they are typical explorers. In character they are frank, yet cautious and reserved, honest, and religious. While modified Danish is the literary language, the Old Norse survives in various forms in many country districts, as it does in Iceland. Since the peasants speak various dialects of Old Norse, and many of the educated consider the presence of the Danish language an anomaly, efforts to revive Norse have been zealously prosecuted for many years.

History. The early history of Norway is preserved only in the legendary sagas. The most recent archæological researches show that the Finnish people were probably the autochthonous inhabitants of the peninsula. The Teutonic stocks probably entered Norway towards the close of the Polished Stone age, but the historical period of Norway reaches no farther back than the ninth century. The petty tribal kingdoms which existed here, as in all northern countries, were united under Harald Haarfagr or Fairhair (died c.933). At this time the Danes and Norwegians (see NORMANS) were the terror of Europe through their plundering expeditions and invasions.

The introduction of Christianity, the result of the intercourse which the Norwegians had with the more civilized parts of Europe through their maritime expeditions, was gradually effected in the hundred years that followed the death of Harald Haarfagr. Haakon the Good, son of Harald Haarfagr, attempted vainly to establish it; but this result was brought about by Olaf Trygvasson (995–1000) and Olaf the Saint (1015–1028; died 1030), wild northern missionaries who bore the cross in one hand and the sword in the other. Olaf the Saint zealously prosecuted the conversion of his countrymen and raised himself to supreme power in the land by the subjection of the small kings or chieftains who in the times of heathenism had subdivided the Kingdom among them. In 1028 Olaf was driven out by Canute the Great of Denmark and, having attempted to recover his throne, was defeated and slain in 1030. On the death of Canute in 1035 Olaf's son, Magnus I, recovered possession of the throne, and thenceforth, till 1319, Norway continued to be governed by native kings. Of these the most noteworthy were Sverre Sigurdsson (1177–1202), a statesman of considerable ability who was put in power by the party of the small landholders, who after years of bitter strife had overcome the party of the nobles and clergy, and Haakon the Old (1217-63), in whose reign independent Norway reached the height of its prosperity. During these centuries the Norse adventurers had established permanent colonies in Iceland and Greenland, and for a time the Orkney and Shetland islands and the Hebrides were in the possession of the Norwegian kings, whose last inroad into Scotland was repelled in 1263. The thirteenth century saw the beginning of written Norse literature and law. The death of Haakon V without male heirs, in 1319, threw the election of a new king into the hands of the national assembly, who made choice of Magnus Eriksson of Sweden, the son of Haakon's daughter. He was in turn succeeded by his son, Haakon, and the latter's son, Olaf, after having been elected King of Denmark in 1375, became ruler of both Scandinavian kingdoms after the death of his father in 1380. This young king, who exercised only a nominal sway under the guidance of his mother, Queen Margaret (q.v.), the only child of Valdemar IV of Denmark, died without heirs in 1387. The ambitious and capable Margaret succeeded to the thrones of Denmark and Norway, and in 1389 she became mistress also of Sweden, and the three kingdoms were bound together by the Union of Calmar in 1397.

From the Union of Calmar till 1814 Norway continued united with Denmark; but, while it shared in the general fortunes of the latter state, it retained its own constitutional mode of government and exercised its right of electing the sovereign until, like the sister kingdom, it agreed of its own free will to relinquish this privilege in favor of hereditary succession to the throne. (See DENMARK.) Norway declined in prosperity and energy after the fourteenth century, in the middle of which the Black Death swept over it, leaving the land exhausted and partially depopulated. Oppressed by Denmark, her colonies and her commerce lost, there seemed to be little left of the national life. The Napoleonic wars severed the union which had existed for more than 400 years. Denmark, because of adhesion to the cause of Bonaparte, was compelled, after the triumph of the allies, to purchase peace by abandoning sovereignty over Norway. Crippled in resources and also bankrupt, she saw herself constrained to sign the Treaty of Kiel in 1814, by which it was stipulated that she should cede Norway to Sweden, receiving by way of indemnity Swedish Pomerania and the island of Rügen, which were subsequently exchanged with Prussia for Lauenburg. The Norwegians refused to admit the validity of the Treaty of Kiel, and a National Diet, assembled at Eidsvold, tendered the crown of Norway, as an independent kingdom, to the Danish Crown Prince Christian Frederick (the future Christian VIII). This assembly drew up a constitution based on the French constitution of 1791. These measures found, however, neither supporters nor even sympathizers among the other nations; and with the sanction of the Great Powers, Bernadotte, Crown Prince of Sweden, led an army into Norway which captured Frederikstad and Frederikshald. Denmark being unable to support the cause of Prince Christian, and Norway being at the time utterly destitute of the means necessary for prosecuting a war, resistance was of no avail, and the Norwegians were glad to accept the proposals made to them by the Swedish King for a union with Sweden on the understanding that they should retain the newly promulgated constitution and enjoy full liberty and independence within their own boundaries. These conditions were agreed to and strictly maintained; a few unimportant alterations in the constitution, necessitated by the altered conditions of the new union, being the only changes introduced in the machinery of government.

Subsequent relations between Norway and Sweden up to 1885 were marked by no violent conflicts, though the Norwegians were firm in maintaining their constitutional rights. After 1885 a growing desire for absolute national autonomy made itself manifest, and a movement arose aiming at the transformation of the bond between the two states into a mere personal union. The movement centred in the demand for a separate consular service and commercial flag for Norway. In June, 1895, the Storthing consented to enter into negotiations with Sweden looking towards a settlement of the consular question. In 1897 negotiations which had been in progress with Sweden since 1895 were abandoned, a universal-suffrage law was passed, and for the third time the Storthing voted for the adoption of a distinct commercial flag, a measure which finally received the royal approval in October, 1899.

Owing to Russia's attack on the national liberties of the Finns, the antiunion movement became less pronounced, but the events of the Russo-Japanese War were regarded as effectually removing all danger from Russia, and the radical tendency once more made itself manifest. An antiunionist agitation was actively carried on throughout the country, and undoubtedly the unyielding attitude of the Swedish government aided largely in driving the conservative elements in Norway into the Radical camp, so that by 1905 the Norwegian nation was practically unanimous in going to the extreme limit of the Radical programme and severing all relations with Sweden.

In February, 1905, Premier Hagerup announced to the Storthing the rupture of negotiations with Sweden, which had been in progress since 1902, and on March 1 the ministry retired from office. It had favored a renewal of negotiations for the revision of the general terms of the union, failing in which it advocated the peaceful dissolution of the ties connecting the two countries, but the temper of the majority was against entering into further dealings with the Swedish government before the establishment of a separate consular system, with or without Swedish consent, had been effected. The attitude of the crown was formulated in an address delivered on April 5 by the Prince-Regent of Sweden during the temporary absence of King Oscar from power, before a combined council of Swedish and Norwegian ministers. He recommended that negotiations be set on foot for the adjustment of all matters concerning the union, on the principle of full equality for both nations. He suggested that a way out of the difficulty would be to provide for the appointment of a foreign minister of Swedish or Norwegian nationality and responsible to both cabinets. Separate consular services might be established on condition that the consuls in all matters affecting relations with foreign powers should be placed under the control of the foreign minister. To this the Norwegian government replied that it could not consent to a resumption of negotiations until a separate consular law was enacted. Such a bill was passed by the Storthing in May, and on the 27th of that month it was submitted for the royal approval. The King's veto was foreseen, and the events which now followed in rapid and dramatic succession were in accordance with a carefully formulated programme. On June 6 the ministry addressed a letter to the monarch informing him of their intention to resign their powers into the hands of the Storthing. On the following day that body proceeded to take final action. It adopted a resolution declaring that inasmuch as the ministry had laid down office and the monarch had declared himself unable to form a new government, the constitutional royal power had ceased to act. The ministry were authorized to remain in office in the capacity of a Norwegian government and to exercise the authority vested in the crown by the constitution and the laws of the Kingdom with such modifications as were necessitated by the fact that the union with Sweden under one king was dissolved in consequence of the King's ceasing to act as ruler of Norway. The Storthing thereupon voted an address to the deposed monarch, expressing its desire that Norway might live at peace with Sweden and with the dynasty under which the country had made such great progress, and asking that it please the King to permit a prince of the royal house to be elected ruler of Norway, after renouncing his rights to the Swedish throne. On the same day (the 7th), the Storthing issued an appeal to the Norwegian people, expressing its desire for the maintenance of relations of peace and amity with Sweden and calling upon all civil and military officials to render obedience to the provisional government. On June 9 the Norwegian flag was raised throughout the country and on Sunday, the 11th, a proclamation announcing the dissolution of the union was read in the churches and was followed in many places by prayers for the health of the aged Oscar II.

On July 28 the Storthing voted that a referendum on the question of separation be taken. On August 13 the Norwegian people declared for a dissolution of the union by 368,200 against 184 votes. On August 31 a conference of Swedish and Norwegian delegates met at Karlstadt to arrange a settlement of questions arising from the separation, and on September 23 the final protocol was signed. It included an agreement for the submission of all differences not affecting the integrity, independence, or vital interests of the two countries to The Hague Tribunal of Arbitration, the agreement to run for a period of 10 years. A neutral zone, extending 15 kilometres on either side of the frontier between the two countries, was established, within which the carrying on of war operations, the stationing of troops, and the maintenance of fortifications were prohibited. Other clauses dealt with the regulation of transit trade and the preservation of the rights of the Laplanders in the northern part of the peninsula. The Karlstadt agreement was approved by the Norwegian Diet on October 9 and by the Swedish Riksdag on October 13. On the sixteenth the Riksdag passed bills repealing the act of union with Norway and recognizing the latter as an independent state.

Even before the dissolution of the Union Norwegian leaders had decided to proffer the crown to Prince Charles, the second son of Frederick VIII of Denmark, then still Crown Prince. On October 31 the Storthing by 86 votes to 30 rejected a motion brought forward by the Radical and Socialist members for a plebiscite on the establishment of a republican form of government, and by 87 votes to 29 the government was endowed with full power to negotiate with Prince Charles of Denmark concerning his acceptance of the Norwegian crown, on condition that the wishes of the people be previously consulted in the form of a referendum. On November 12–13 the people decided in favor of offering the crown to Prince Charles by 259,563 votes against 69,264, and on November 18 the Storthing unanimously declared Prince Charles of Denmark to be elected King of Norway. On the 20th a deputation of the Storthing arrived at Copenhagen to make formal announcement of the election, and the aged Christian IX accepted the crown in behalf of his grandson, who subsequently announced that he would assume the title of Haakon VII (q.v.), bestowing on his infant son, Alexander, the name of Olaf.

As a result of franchise reforms during the last decade Norway has become, in regard to its qualifications for suffrage, the most democratic state in Europe. In 1898 the franchise was conferred upon all male citizens of not less than 25 years of age who had resided five years in Norway. In 1901 the municipal suffrage was granted to all male citizens without restrictions and to all married women of not less than 25 years of age who pay taxes on an annual income of not less than 300 krones ($84), and to all married women whose husbands pay taxes on an income of a similar amount. In 1907 the Storthing granted suffrage by a decisive majority to all women possessed of the municipal franchise. The electorate was increased by nearly 300,000, a little over half of the female population of the required age. By this law Norway became the first sovereign European state to grant parliamentary suffrage to women.

Before 1905 the question of separation from Sweden was the main line of division between the two chief parties. Since separation has been accomplished, new issues have arisen. The chief issues of the liberal party have been woman suffrage, old-age pensions, and sickness and employment insurance. Subsequent to the dissolution a coalition ministry of Liberals and Conservatives under the leadership of Christian Michelsen was formed. This cabinet held sway until Oct. 28, 1907. After a short succession by one of Michelsen's followers, a new ministry was formed by the Liberal leader, Gunnar Knudsen. In the election of 1909, the first in which women voted, the Conservatives were returned to power under the leadership of Konow. After the election of 1909 there were in parliament 63 Conservatives and Moderates, 47 Liberals, 11 Social Democrats, and 2 Independents. At the election of November, 1912, the government lost heavily to the Liberals and Social Democrats.

A commission was appointed as early as 1885 to investigate workingmen's insurance, and in 1895 a law was enacted providing for insurance against accidents. Since the establishment of Norwegian independence progressive advance in regard to social legislation had been marked. On Sept. 18, 1909, compulsory sickness insurance for both industrial and agricultural laborers was established; an unemployment insurance similar to the Ghent system has also been enacted. Norway has established a liquor-licensing law similar to the Swedish system, but it differs in that the profits go to the state instead of to the municipality. Since its liquor-license system has been established "Norway has been transferred from one of the most drunken of European nations to one of the least."

As a result of woman suffrage women have been given the right to sit on juries and have been appointed as heads of tax commissions. The laws in regard to divorce have been made very lenient. Divorce may be procured by mutual consent or by either party proving drunkenness, adultery, lunacy, venereal disease, or wasteful extravagance. The boundary dispute between Norway and Sweden was settled by the appointment of a permanent board of arbitration, Oct. 23, 1909.

The farmers of Norway have established coöperative societies that have been of great influence in marketing their products and furnishing amusement and education to the members. One of the most important of these coöperative societies has a membership of 6000 farmers. It has a central building in Christiania in which are handled all kinds of farm machinery and other aids in the developing of agriculture. This building is used as a hotel for visiting farmers and contains a theatre for their amusement.

On account of the European War the Scandinavian sovereigns of Sweden, Norway, and Denmark held a conference at Malmö, Sweden, Oct. 18, 1914. It was agreed to maintain the neutrality of the three Scandinavian nations and to coöperate for the protection of their joint interests. See WAR IN EUROPE.

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NORWAY. A town in Oxford Co., Me., 49 miles north of Portland, on the Grand Trunk Railway (Map: Maine, B 4). It is in an agricultural and lumbering region and has manufactories of shoes, hosiery, and lumber products. There are also some dairy, live-stock and fruit-growing interests. Pop., 1900, 2902; 1910, 3002.

NORWAY. A city in Dickinson Co., Mich., 9 miles east by south of Iron Mountain, on the Chicago and Northwestern and the Wisconsin and Michigan railroads (Map: Michigan, B 3). Its principal industry is iron mining, rich beds of ore being found in the vicinity. The water works and electric-light plant are owned by the city. Pop., 1900, 4170; 1910, 4974.

NORWAY PINE. See PINE.

NORWE'GIAN LANGUAGE. The language which, together with Icelandic and Faroese, forms the West Norse division of the Scandinavian group, which together with Gothic comprises the East Germanic family. Like the other members of this group division the Norwegian is more homogeneous than either Danish or Swedish. Chiefly as a result of phonetic changes its inflections are less original than those of Icelandic, although it retains the three genders. Its common Scandinavian characteristics are the suffixed definite article, the medio-passive, and the neuter ending *-t*. Among other features there may be noted the changing of *s* to *r* in case endings; the breaking of a tonic *e* into *ea*, becoming later *ia*, and into *eo*, later *io;* the development of a *u-* umlaut; the loss of the initial *j;* and later the disappearance of *v* when followed by *u*, *o*, or *y*. Norwegian was divided at an early period into two main dialect groups—the Eastern, including the Gudbrandsdal and the Trondhjem, which resembles the Swedish, and the Western, represented by Hardanger, Voss, Sogn, and Sætersdal, which approaches the Icelandic. A subdivision of the West Norwegian, spoken along the coast, resembles the Danish. The oldest monuments of Norwegian consist of runic inscriptions, among which that of the "Golden Horn" is the best known; the Einanger Stone is the oldest. In fact, they are the earliest specimens of any Germanic language.

The early period of the language is similar to that of Icelandic (q.v.), from which it separated c.900. In the thirteenth century the differences between the two languages became more marked. During the period from 1350 to 1530 Norwegian was strongly influenced first by the Swedish and later by the Danish. As a result of the Union of Calmar (1397), by which Norwegian independence was lost, Danish was substituted for the native language for purposes of literature and public business, although the Norwegian survived in the country districts in various dialects and was used for social intercourse and the composition of folk tales and ballads. The modern standard language shows many divergences in forms, in vocabulary, and in syntax from the Danish of Denmark, and is generally distinguished from it as Dano-Norwegian. By the Norwegians themselves the dialects and the standard language are alike called Norsk, but this usage is not recognized by scholars. During the last 50 years efforts have been made to emphasize the Norwegian character of the language by adapting its orthography to local pronunciation and by introducing forms from the native speech. Dano-Norwegian is Danish with a large influx of Norwegian words and construction and Norwegian pronunciation.

An important language movement in Norway is attracting attention throughout Scandinavia. It is no less than the creation and spread of a new form of Scandinavian speech, called by its originator, Ivar Aasen (q.v.), Landsmaal (national tongue). It is a written language, not used for social intercourse, and is based upon the existing dialects of Norway. At first this artificial language was used exclusively in poetry, but in 1858 the first newspaper in the Landsmaal appeared, and since then it has spread rapidly. In 1868 a society for the propagation of the new idea was established, branches of which now exist all over Norway. A number of acts have been passed by the Parliament in favor of the Landsmaal, among which may be mentioned that of founding a chair in that subject at the University of Christiania. At present all acts of Parliament are published both in Dano-Norwegian and in the Landsmaal. The principal literary supporters of the movement are the novelist Arne Garborg and the poets Vinje and Janson. A movement was inaugurated some years ago to have the Landsmaal recognized by the government as the official language of Norway instead of the Rigsmaal, or Dano-Norwegian. At the present writing (1915) this movement is successful.

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NORWEGIAN LITERATURE. Norwegian literature is commonly considered to have begun with the separation of Norway from Denmark and the adoption of the Norwegian constitution in 1814. The history of literature in Norway, however, reaches back a thousand years before this time to Bragi (c.800–850), the first scald who is historically known to have composed poetry in the Old Norse language. His principal poem is the *Ragnars-drápa*, which owes its preservation, in common with much of the scaldic poetry of old Norway, to the Icelander Snorri Sturluson, who incorporated it in his *Snorra Edda*. But the oldest Norwegian literary monuments are the runic inscriptions, the earliest known (the Einanger Stone) dating from the third century. Some of them, as those on the Tune Stone, are rhymed. It is thus evident that the Norwegians cultivated literature long before the date usually given as the beginning of its history.

There are a number of other poets in this and the succeeding period in Norway. After Bragi the next in importance is Thjodolf of Hvin (c.855–930), whose principal poem is the *Haustlöng*, also contained in the *Snorra Edda*, Thorbjörn Hornklofi, and Eyvind Skáldespillir, the greatest of all the Old Norse poets. Besides this poetry by known authors, most of the anonymous poems of the *Elder Edda*, composed, it is thought, between 875 and 1025, are doubtless ultimately of Norwegian origin. To the Old Norse prose literature of the thirteenth century Norway also made important contributions. At the head of these works stands the *Thidreks Saga*, the story of Dietrich of Bern, written about 1250 by an unknown author and extremely valuable as a storehouse of Germanic legend. The *Karla Magnús Saga*, the story of Charlemagne, from this same century, and the narrative of Barlaam and Josaphat, *Barlaams Saga ok Josaphats*, are also by Norwegian authors. There are in addition to these several old law codes of value as historical material and the unique dialogue between father and son, the *Konungs Skugg-sjá*, or *Speculum Regale*, written in the reign of Sverre (1184–1202) and possibly by the King himself.

After the accession of Olaf, the son of Margaret, in 1380 Norwegian history for four centuries becomes Danish history. As a province of Denmark Norway lost her national character. Even the Reformation failed to arouse her from this lethargy and not until 1814, when Norway was ceded to Sweden by the Peace of Kiel, was there evidence of a national awakening. The literary history of this whole period in Norway coincides with the history of Danish literature, with which it is inseparably connected.

After the *Eufemiavisur* of about 1300, so called from Eufemia, queen of Haakon Magnusson, who had these paraphrases of French and German originals—*Ivan*, *Duke Frederick of Normandy*, and *Flores and Blanzeflor*—made in the Norwegian language, there is no poetry until the period of learning subsequent to the Reformation. The first names at this time are Peter Dass (1647–1708) and Dorothea Engelbretsdatter (1635–1716). The former, a Norwegian clergyman, wrote secular and religious poems which have made him to this day the favorite poet of the common people of Norway. The names that follow are those of Norwegians, but, as has been indicated, their place is in Danish and not in Norwegian literature. This is true of Ludvig Holberg (1684–1754), the father of the Danish drama; of Christian Braunmann Tullin (1728–65), the poet of nature; of Johan Herman Wessel (1742–85), the dramatist and poet, after Ewald the second great name in the literature of the so-called Age of Enlightenment.

An important factor in the development of a national Norwegian literature, as it was a matter of the greatest significance for Danish literature itself, was the formation of the *Norske Selskab* (Norwegian Society) in Copenhagen in 1772. The intentions of the society were by no means to make propaganda for things Norwegian, as opposed to things Danish, but it is interesting to note that among its members are a number of poets who already exhibited a distinctly national feeling, which in choice of material and natural environment and in inherent spirit is not Danish, but Norwegian. The Norwegian poets of the period—Johan Nordal Brun (1745–1816), who wrote *Zarina*, the first Danish tragedy produced on the stage, and some of the most popular of the patriotic songs of Norway; Claus Fasting (1746–91), distinguished for his epigrams and criticism; Claus Frimann (1746–1829); Enevold Falsen (1755–1808)—important as they were, have but little meaning at the present time. Edvard Storm (1749–94), who wrote ballads and songs in Norwegian peasant dialect, some of which are known throughout Norway to this day, was the only Norwegian writer of importance who held to the Danish side of this controversy, which strikingly marks the last days of what may be called the Danish period in the literary history of Norway.

The actual history of Norwegian literature as a product in Norway of purely national conditions finds its beginning at the time of the separation of the Kingdom in 1814 from Denmark. The Norwegian Society presently changed the scene of its activity from Copenhagen to Christiania, but, although its traditions subsequently influenced popular taste, it never afterward played an active part in literature. The first poetry which arose under these new conditions in Norway was vehemently patriotic and is called by the Norwegians themselves, from the day of the adoption of the Norwegian constitution, *Syttendemai-Poesi* (the poetry of the seventeenth of May). From among the numerous writers of the time three only, the so-called Trefoil, may be mentioned as of especial significance—the lyric poet C. N. Schwach (1793–1860), the poet and dramatist H. A. Bjerregaard (1792–1842), and the novelist Mauritz Christoffer Hansen (1794–1842), whose best work is contained in his stories of peasant life. The first great poet of modern Norway, Henrik Wergeland (1808–45), became, as no other writer in Norway before him, the poet of the people. His first great success was achieved with a volume of lyrics, published in 1829. In 1830 appeared the long dramatic poem *Skabelsen, Mennesket og Messias* (The Creation, Man, and Messiah), which drew out in 1832 a pamphlet on "Henrik Wergeland's Poetic Art and Poetry" by Johan Sebastian Cammermeyer Welhaven (1807–73), mercilessly attacking him for his sins of poetical commission. The controversy between the two poets, at first personal, subsequently assumed a wider character and presently divided the whole country into a national and a critical faction, the one the embodiment of the pro-Norwegian spirit of the seventeenth of May, the other the party of "intelligence," which looked to perpetuate what were in reality the hereditary tendencies of the Norwegian Society and to develop Norwegian culture harmoniously with that of Europe and especially that of Denmark. The contest was waged even more violently after the publication in 1834 of Welhaven's polemical poem, a cycle of sonnets called *Norges Dæmring* (Norway's Twilight), in which he vigorously censured the mistaken zeal of the ultranational faction which Wergeland represented. The battle was ultimately won by Welhaven and his followers, who had, in point of fact, revolutionized the æsthetic taste of Norway and by the introduction of a sound criticism had determined the direction of its future literary development. Welhaven, between 1839 and 1859, published numerous lyrical poems. His critical prose is among the finest that Norway has ever produced. Wergeland's best work was done after the downfall of his fortunes and his popularity. His last poem, *Den engelske Lods* (The English Pilot), is his greatest. Andreas Munch (1811–84), poet and dramatist, followed the direction pointed out by Welhaven. His first work of importance was the romance *Den Eensomme* (The Solitary), published in 1846. His *Billeder fra Nord og Syd* (Pictures from North and South) is considered one of the best prose works in the language.

Important for its bearing upon the development of a national literature in Norway was the attention that was presently paid to the wealth of native material contained in the old folk tales and popular poetry, which has been preserved among the peasantry in great abundance and under the peculiar conditions of the country has retained an essentially national character in manner and matter. The principal workers in this field at the beginning were the naturalist Peter Christen Asbjörnsen (1812–85) and Jörgen Moe (1813–82), who published conjointly in 1841 *Norske Folke-Eventyr* (Norwegian Popular Tales). Asbjörnsen published subsequently *Norske Huldre-Eventyr og Folkesagn*, which contains descriptions of his own of natural scenery and popular life. The recognition of this material pointed out a new direction in Norwegian literature and has had a profound effect upon all writers and upon all spoken language ever since.

The present period of Norwegian literature, and the period of its broadest development, begins with Björnson and Ibsen, the greatest writers that Norway has produced. With them literature enters upon a new era of productivity at home and, what had not been the case before, of influence abroad; for the work of these two poets, even at an early time in their career, had carried the name and fame of Norwegian literature far beyond the confines of Norway and of Scandinavia until now, and principally through them, it has become in the widest sense a living and forceful part of the literature of the world. (For details, see Björnson; Ibsen.) Jonas Lie (q.v.), who plainly shows the influence of Björnson, wrote sea stories that attained great popularity. His first novel, *Den Fremsynte* (The Visionary), appeared in 1870. His most successful and widely known novel is *Lodsen og hans Hustru* (The Pilot and his Wife). He attains, however, a higher artistic result in his later novels of modern social life—*Livsslaven* (The Life Convict), *Familien paa Gilje* (The Family at Gilje), *En Malström* (A Maelstrom), and others that have been written since 1883. Anna Magdalena Thoresen (1819–1903) also shows the influence of Björnson in her tales of nature and popular life. Her *Billeder fra Midnatssolens Land* (Pictures from the Land of the Midnight Sun) is possibly her best work. The most original of the woman writers of Norway is Camilla Collet (1813–95), the sister of the poet Wergeland, whose most important novel is the realistic *Amtmandens Döttre* (The Magistrate's Daughters). After Ibsen, Björnson, and Lie, the fourth great name in Norwegian literature of the present period is Alexander Kielland (1849–1906). Although his subjects are exclusively Scandinavian, he belongs, more than any of his countrymen, in his literary affinities less to Norway and more to Europe, whose general cultural tendencies he reflects. Kielland's best work is contained in his short stories, the first volume of which appeared as *Novelletter* in 1879. His novels, the greatest of which is *Skipper Worse*, whose theme is the pietistic movement in Norway, are all novels of tendency.

Learned literature in Norway, although it has made important contributions to theology and to philosophy, has found its most characteristic expression in history, philology, and in accounts of polar exploration. The founder of historical writing in Norway was Rudolf Keyser (1803–64), who wrote *Norges Historie* (History of Norway), *Den norske Kirkes Historie* (History of the Church in Norway), and other works on the history and antiquities and literature of his native country. His pupil, Peter Andreas Munch (1810–63), wrote as his most important work *Det norske Folks Historie* (History of the Norwegian People). In collaboration with Keyser and Carl Richard Unger (1817–97) he also did philological work of value in editing Old Norse texts. Johan Ernst Sars (1835–), in his *Udsigt over den norske Historie* (Review of Norwegian History), produced one of the most notable prose works in the language. Noted philologists include Sophus Bugge (1833–1907), Johan Storm (1836–), Gustav Storm (1845–1903), Hans Ross (1833–1914), Hjalmar Folk (1859–), Alf Torp (1853–), and J. K. Quigstad (1853–). Mention should be made of the folklorist Moltke Moe (1859–1913); of the famous discoverers Fridtjof Nansen (1861–), Otto Sverdrup (1855–), and Roald Amundsen (1872–); of the theologians C. P. Caspari (1814–92) and Gisle Johnson (1822–94); and of the Egyptologist J. D. C. Lieblein (1827–1911).

In every field of literary activity modern Norway has unfolded, and is still unfolding, an extraordinary development, and this not only from the point of productivity, but in the quality and character of the work produced. The most distinct tendencies in Norwegian literature of the present period are the pessimistic-naturalistic direction originally pointed out by Ibsen and the optimistic-realistic direction of Björnson and his followers, but there are writers who belong to neither school. Other writers than those mentioned have made a name outside of Norway as well as at home. Among them are Aasmund Olafsson Vinje (1818–70), Kristoffer Janson (1841–), Arne Garborg (1851–), Amalie Skram (1847–1905), Knut Hamsun (1860–), Gabriel Finne (1866–99), Thomas P. Krag (1868–1913), Vilhelm Krag (1871–), Hans Kinck (1866–), and Gunnar Heiberg (1857–). The chief lyric poet of the early twentieth century is Herman Wildenvey (1885–). See separate articles on many of the persons mentioned. See also Landsmaal.

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NORWE′GIAN MUSIC. See Scandinavian Music.

NORWE′GIUM (Neo-Lat., from ML. *Norwegia, Norvegia*, Norway). A name given by Dahll to a substance separated by him from the mineral gersdorffite found on the island of Osterö, Norway. It is also said to exist in some specimens of unrefined lead.

NORWICH, nŏr′ĭj *or* nŏr′ĭch. A county borough and a city, the county town of Norfolk, England, on the Wensum, immediately above its confluence with the Yare, about 18 miles west of Yarmouth and 114 miles by rail north-northeast of London (Map: England, H 4). The town is skirted on its north and east sides by the river. On the west and south it was surrounded by walls (1294–1342), which have been removed to make room for the extension of the city. In the market place and its vicinity are many large shops and good houses. The castle, finely situated on an elevation near the centre of the town, originally covered with its works an area of about 23 acres. The bridge over the ditch has one of the largest and most perfect Anglo-Norman arches in existence. The massive quadrangular Norman keep is now used as a museum. The cathedral church of the Holy and Undivided Trinity, one of the most perfect examples of Norman architecture in England, was founded in 1096 by Bishop Herbert de Losinga and dedicated in 1101. It is 411 feet long, 191 feet broad at the transepts, and is surmounted by a spire 315 feet high (after Salisbury the highest in England). Near the cathedral are a number of ancient and interesting structures now more or less in ruins, among which may be mentioned the Ethelbert gateway (about 1300) and the Erpingham gate (1420), the former in Decorated English, the latter in late Perpendicular, and both valuable and rich specimens of their styles. There are more than 40 churches, among which are St. Peter's Mancroft, a cruciform edifice of the fifteenth century, with a remarkably fine peal of 12 bells, St. Andrew's, St. Clement's, St. George's, St. Giles's, and St. Michael's. The free grammar school, founded by Edward VI, occupies a Decorated edifice (about 1316). St. Andrew's Hall, a splendid example of Perpendicular, has been the scene of the triennial music festivals since 1824; it was restored in 1863. Another fine structure is the Guild Hall (Perpendicular, 1408–13). The city possesses public recreation grounds covering an area of 200 acres and owns profitable real estate, markets, and a sewage farm. It also maintains a free public library, baths, Norwich Castle, gardens, and museum and provides allotments and technical education. About 4 miles south of Norwich is Castor St. Edmunds, which prior to the Roman era was called Caister and under the Romans received the name Venta Icenorum. Norwich is the seat of extensive and flourishing industries, among which are the manufacture of mustard, starch, beer, shoes, foundry products, and agricultural implements, and dyeing and malting. It has also extensive nursery gardens. The city was one of the earliest manufacturing centres for textiles in England. This branch of industry, however, has declined. Its shipping trade, facilitated by a canal and river system of communication with the sea, is chiefly in agricultural products and coal. Annual fairs are held.

Norwich occupies a place in history from the time of the earliest Danish invasions. It had its origin in the castle erected as a stronghold by the East Anglian kings and resorted to as a place of safety by the inhabitants of Venta Icenorum, who gave it the name of North-wic, or northern station or town. The East Anglian bishopric was removed hither in 1094. About 4000 Flemings settled at Norwich in the reign of Elizabeth and gave great impetus to the prosperity of the town by the manufactures which they introduced. The municipality dates from the reign of Henry II. Norwich returns two members to Parliament. Pop., 1851, 68,000; 1891, 100,970; 1901, 111,733 (the increase in the decade being 10.7 per cent); the 1901 population on the area at the 1911 census was 113,922; pop., 1911, 121,478 (increase 6.6 per cent). The area of the city is 7896 acres. Consult: Augustus Jessopp, *Norwich* (London, 1884); Bayne, *History of Norwich* (Norwich, 1889); C. H. B. Quennell, *Norwich Cathedral, with a History of the See* (London, 1898); C. B. Hawkins, *Norwich, a Social Study* (ib., 1910).

NORWICH, nŏr′wĭch *or* nŏr′ĭch. A town, including a city of the same name, and one of the county seats of New London Co., Conn., 95 miles southwest of Boston, Mass., and 50 miles southeast of the State capital, Hartford, on the Thames River, at the head of navigation, and on the Central Vermont and the New York, New Haven, and Hartford railroads (Map: Connecticut, G 3). It is built among the hills, in the valleys of the Yantic and Shetucket, which here form the Thames, and has exceptional water power, a prominent feature in the development of its industrial interests. There is a large trade in lumber, coal, manufacturers' supplies, groceries, dry goods, etc. Norwich is one of the prominent manufacturing centres of the State, the chief articles produced being firearms, cotton, silk, velvet, and woolen fabrics, stoves and furniture, cast iron, leather and belting, and a great variety of woodworking machinery. The city is noted for its picturesque beauty and possesses many fine residences, several public parks, and streets shaded with beautiful elms and maples. It has a Free Academy, which was built and endowed by private subscriptions from wealthy citizens, in connection with which a fine building, including an art museum and costing nearly $200,000, the gift of W. A. Slater, has been erected. Other institutions include the William W. Backus Hospital, representing an endowment of over $500,000, and the Otis Free Library. The courthouse, the Masonic Temple, the State Armory, and St. Patrick's Roman Catholic Church are notable structures. The Indian burying ground where Uncas is buried is of historic interest, as is the spot where Miantonomo fell. The government, under a revised charter of 1877, is vested in a mayor, chosen every two years, and a bicameral council, elected one-half each year on a general ticket, which controls elections of all administrative officials. The water works, gas, and electric-light plant are owned and operated by the municipality. Pop., 1900, 24,637; 1910, 28,219; 1914 (U. S. est.), 29,032. Settled in 1659 by a company from Saybrook, Norwich (named from Norwich, England) was chartered as a city in 1784 and rechartered in 1871. It was the home of Samuel, Jabez, and Jedediah Huntington, Christopher Leffingwell, and Nathaniel Niles—all prominent during the Revolutionary period. Consult F. W. Caulkins, *History of Norwich* (Hartford, 1866), and W. C. Gilman, *Celebration of the 250th Anniversary of the Settlement of the Town of Norwich* (Norwich, 1912).

NORWICH. A city and the county seat of Chenango Co., N. Y., 43 miles northeast of Binghamton, on the Chenango River and on the New York, Ontario, and Western and the Delaware, Lackawanna, and Western railroads (Map: New York, E 5). It has excellent schools and a public library and among its fine structures are the municipal building, county jail, the courthouse, and the Lackawanna depot. Norwich is of considerable importance as an industrial centre, having railroad shops, an iron foundry, knitting mills, shoe factories, stone quarries, a milk-condensing plant, and manufactories of drugs and medicines, perfumes, gloves, silk ribbons, hammers, etc. There are also many creameries, the city being surrounded by a productive dairying and farming region. Pop., 1900, 5766; 1910, 7422; 1915 (State census), 8382.

NORWICH, GEORGE GORING, EARL OF (c.1583–1663). An English Royalist. He was made clerk of the Council of Wales, and among other important monopolies a large share of the tobacco grant was given to him (1636). After Charles I had become a prisoner in the hands of Parliament, Goring headed an abortive Royalist rising in Kent. The Commons voted that he should be banished, but rescinded this vote, and a special court sentenced him to death; but he was not executed, either because the Speaker, Lenthal, who gave the casting vote, had received favor from Goring, or on the pleading of the Dutch and Spanish ambassadors. From 1652 to the Restoration he lived on the Continent, and Charles II granted him a pension of £2000 and reappointed him to the Privy Council.

NORWICH CRESTED CANARY BIRD. See CANARY.

NORWICH UNIVERSITY. An institution for higher education founded in 1819 at Northfield, Vt., by Capt. Alden Partridge and first known as the American Literary, Scientific, and Military Academy. It was removed in 1824 to Middletown, Conn., and to Norwich in 1829, where it was incorporated under its present name in 1834. The buildings of the university were destroyed by fire in 1866, and the institution was removed to Northfield in ~~1898~~ 1866. It is officially recognized as the military college of the State. It has accommodations for about 200 students and has 18 instructors and professors. The institution was established with the purpose of fitting college men, seeking vocations entirely civil and peaceful, for effective service as volunteers in time of war. The record of its graduates indicates unusual efficiency in peaceful vocations and remarkable success in their occasional war service. Among the famous students of the university is Admiral George Dewey. The president in 1915 was C. H. Spooner. Consult G. M. Dodge, *History of Norwich University, 1819–1911* (3 vols., Montpelier, 1911).

NOR'WOOD. An electoral district and favorite residential section in the south of the metropolitan borough of Lambeth, London, England, 8 miles south of St. Paul's Cathedral (Map: London, F 7). It was formerly a suburban village noted for Beulah Spa, a popular pleasure ground picturesquely laid out around a mineral spring, now built over, and represented by the Beulah Spa hotel. Norwood is divided into Upper, Lower, and South Norwood. It adjoins the grounds of the Crystal Palace. Norwood Junction is an important suburban railway station. Pop., 1901, 35,887; 1911, 62,296.

NORWOOD. A town in Norfolk Co., Mass., 14 miles southwest of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). Noteworthy among the features of the town is the Norwood Civic Association, the centre of all social and civic activities, which has a swimming pool, a gymnasium, an athletic field, recreation rooms, a visiting nurse association, an emergency hospital, and a dental clinic. It has the Morrill Memorial Library, and among its industrial plants are railroad repair shops, large tanneries, iron foundries, manufactories of umbrellas, leather goods, glue, and ink, two extensive printing establishments, a grain mill, and two book binderies. Norwood was incorporated in 1872; the government is administered through town meetings. The water works and electric-light plant are owned by the municipality. The commission form of government (city-manager plan) was adopted in 1915. Pop., 1900, 5480; 1910, 8014; 1914 (U. S. est.), 9091.

NORWOOD. A city in Hamilton Co., Ohio, adjoining Cincinnati on the northeast, on the Baltimore and Ohio Southwestern and the Cincinnati, Lebanon, and Northern railroads (Map: Ohio, A 7). It is well laid out on a site of great natural beauty and is a favorite residential suburb of Cincinnati. Among the noteworthy features are the Carnegie Library, city hall, and the market house. There are several important manufacturing establishments whose buildings are noteworthy for their architecture and for their splendid equipment. Among these plants are the lithographing and playing-card works, the "elastic"-bookcase factory, and the electrical manufacturing concern. Pianos, laundry machinery, washing machines, machine tools and ironworking machinery, iron castings, safes and vaults, plumbers' supplies, and wood millwork also are manufactured. Settled about 1790, Norwood was incorporated as a village under the general laws of 1888 and became a city in 1902. The water works and the sewerage and electric-light plants are owned and operated by the muncipality. Pop., 1900, 6480; 1910, 16,185; 1914 (U. S. est.), 20,320.

NOSAIRIANS, nô-sī′rĭ-*a*nz. An Arab sect living in the mountains between the northern part of Lebanon and Antioch; found also in Antioch, at Adana, and in various places along the Syrian coast. The origin of the sect is involved in obscurity, though it appears probable that it was founded by a certain Mohammed ibn Nosair at the close of the ninth century. The sect belongs to the so-called Shiitic branch of Islam (q.v.) and may be described as the result of the accommodation of Islam to the old heathen religion of Syria, which survived in this region down to the Arab conquest. Their tenets are therefore a mixture of paganism and Mohammedanism, with some faint suggestions from Christianity, particularly in the form of Gnosticism. While their doctrines bear a resemblance to those of the Ismailitic sect and they are clearly influenced by this sect, still they manifest an independent development of their beliefs. Their sacred book is called Majmu‘ and is divided in suras like the Koran. They divide time into seven cycles, each corresponding to an appearance of the divine spirit in some personality. Divine honors are paid to Ali and his sons, who became the representatives of the ancient deities of Syria and Phœnicia. The standing formula of the religion is, "I bear witness that there is no god but Ali." They also set up a kind of trinity, associating with Ali, Mohammed, and Salman al Farisi. The latter two are emanations of Ali, Mohammed being created by Ali and Salman by Mohammed. Ali is designated as the "lord," Mohammed as the "veil," and Salman as the "gate." The symbol of Ali is *ma‘na* (the idea), the symbol of Mohammed is *ism* (the name), and that of Salman is *bab* (the gate). This trinity is eternal, and, despite the superficial resemblance of this belief to the Christian doctrine, it appears rather to be due to the transformation of the ancient local cults in Syria and Phœnicia. Salman al Farisi in turn created five persons, known as "the incomparable ones," who are the real creators of the world. The mystical character of their doctrines is further increased by the assumption of two worlds, an upper and a lower one, and, corresponding to seven divine manifestations in each, there are seven adversaries, one appearing with each manifestation, which, moreover, consists in each case of a *ma‘na* (Logos, idea—representing Ali) and an *ism* (name—representing Mohammed). Leaving aside the seven—or, rather, fourteen—divine manifestations in the upper world, we have for the lower world as the seven manifestations of *ma‘na*, Abel, Seth, Joseph, Joshua, Asaf, Peter, and Ali, and as seven manifestations of *ism*, Adam, Noah, Jacob, Moses, Solomon, Jesus, and Mohammed.

There are four sects among the Nosairians, viz.: (1) the *Haidaris;* (2) the *Shamsis*, who identify Ali with heaven, Mohammed with the sun, and Salman with the moon; (3) the *Kalazis*, who hold that Ali is the moon; and (4) the *Ghaibis*, who worship the air.

Among the populace great veneration is paid also to Khodr, a mythical personage corresponding to St. George, who delivered the country of a great monster, and in return for this and other feats the Nosairians dedicate their daughters to Khodr. Before giving them in marriage they proceed to the convent of Mar Jorjis (St. George), near Beirut, and there pay ransom money to the monks of the convent, the amount varying, according to the vow, from a third to the entire sum of the dowry.

The Nosairians believe in migration of souls, which for the faithful will be a progress in seven stages from pure to more pure, until they become stars, as they originally were; but sinners will be transformed into Jews, Christians, camels, mules, asses, dogs, and sheep. They practice circumcision and ablution and pray in the open air three times a day. Their chief festivals are (1) al Gadir, falling on the eighteenth day of the month of pilgrimage, commemorating the supposed proclamation by Mohammed of Ali as his successor; (2) Fitr, "breaking of the fast," sacred to Mohammed and the first of the festivals of the year; (3) the festival of sacrifices, sacred to Ismail, the founder of the Ismailitic sect, on the tenth day of the pilgrimage month; (4) Ashura, the tenth day of the month of Muharram, commemorating the murder of Husain, the son of Ali; (5) al Gadir the second, on the ninth day of the first month of Rabi', commemorating Mohammed's recognition of the mission of the sons of Ali, Hasan, and Husain; (6) Christmas, known as "the festival of the birth," on the night of the twenty-fourth of December, in memory of the birth of the Messiah. Besides these there are a large number of minor festivals, betraying Persian as well as Christian and old Syriac influences.

The charges of immoral practices indulged in on the occasion of their festivals are pure fabrications, due in part to the mystical character of some of their rites, particularly of those practiced at the initiation of members of the sect. Their religion inculcates benevolence, honesty, and patience. While split up into various divisions, the subsects differ only in matters of minor importance. Each community is governed by a chief, who is almost entirely independent. The Majmu‘ is contained in the *Kitab al Bakuta*, published at Beirut in 1863 and translated by Salisbury in the *Journal of the American Oriental Society*, vol. viii (New Haven, 1889). Consult René Dussaud, *L'Histoire et la religion des Nosairies* (Paris, 1900).

NOSE (AS. *nosu*, *nasu*, OHG. *nasa*, Ger. *Nase*, nose; connected with Lat. *nasus*, Lith. *nósis*, OChurch Slav. *nosŭ*, Skt. *nas*, nose). The nose is not only the organ of smell, but is likewise part of the apparatus of respiration and voice. Considered anatomically it may be divided into an external part—the projecting portion—to which the term "nose" is popularly restricted; and an internal part, consisting of two chief cavities, the nasal fossæ, separated from each other by a vertical septum. In it are found the spongy turbinated (scroll-like) bones, and communicating with it by narrow channels are the accessory nasal sinuses. These cavities occur in pairs, are situated in the superior maxillary, frontal, sphenoid, and ethmoid bones, and are known respectively as the antrum of Highmore, the frontal sinus, the sphenoid sinus, and the ethmoid labyrinth. The mucous membrane lining them is continuous with that of the nose, and their function appears to be to assist the nostrils in moistening and warming the inspired air, and to lend resonance to the voice.

The external portion of this organ may be described as a triangular pyramid which projects from the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by means of a narrow bridge, formed on either side by the nasal bone and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the nostrils, which overhang the mouth. The margins of the nostrils are usually provided with a number of stiff hairs (vibrissæ), which project across the openings and serve to arrest the passage of foreign substances which might be drawn up with air intended for respiration. The skeleton or framework of the nose is partly composed of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which are attached three or four small cartilaginous plates, termed sesamoid cartilages; there is also the cartilage of the septum which separates the nostrils and articulates posteriorly with the perpendicular plate of the ethmoid and with the vomer. The lower lateral, or alar cartilage, by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved and the nostrils dilated or contracted by small muscles.

The nasal fossæ, which constitute the internal part of the nose, are lofty and of considerable depth. They open in front by the nostrils, behind in the upper part of the pharynx, and near the orifices of the Eustachian tubes, which proceed to the tympanic cavity of the ear.

The mucous membrane lining the nose and its cavities is called pituitary, from the nature of its secretion; or Schneiderian, from Schneider, the first anatomist who showed that the secretion proceeded from the mucous membrane and not, as previously imagined, from the brain. It is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see EYE), and with that of the pharynx and middle ear posteriorly. On the septum and spongy bones bounding the direct passage from the nostrils to the throat the lining membrane is comparatively thick, partly because it is rich in glands, but chiefly, perhaps, from the presence of submucous plexuses of arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying as they do in a region exposed more than any other to external cooling influences, appear to be designed to warm and moisten the air on its passage to the lungs. In the vicinity of the nostrils the mucous membrane exhibits papillæ and a scaly epithelium, like the corresponding parts of the skin. In the sinuses and in all the lower region of the nose the epithelium is of extreme delicacy, being of the columnar variety, and clothed with cilia. In the upper third of the nose—which is termed the olfactory region—the epithelium changes from ciliated to columnar, assumes a sienna-brown tint, and increases remarkably in thickness, so that it forms an opaque soft pulp upon the surface. The olfactory region abounds in glands, apparently identical with sweat glands, which dip down in the recesses of the submucous tissue among the ramifications of the olfactory nerve. They are named Bowman's glands.

The nerves of the nose are the first pair or olfactory, which are specially connected with the sense of smell; branches of the fifth pair, which confer ordinary sensibility on its skin and mucous membrane; and motor filaments, from the facial nerves to the nasal muscles. The olfactory nerve on each side is connected with the inferior surface of the brain by an external, a middle, and an internal root, which unite and form a flat band (or, more correctly, a prism) which, on reaching the cribriform plate of the ethmoid bone, expands into an oblong mass of grayish-white substance, the olfactory bulb. From the lower surface of this bulb are given off the olfactory filaments, 15 or 20 in number, which pass through the cribriform foramina and are distributed to the mucous membrane of the olfactory region. The branches of the fifth pair (or trifacial) given to the nose are the nasal nerve (derived from the ophthalmic division), which supplies the skin and mucous membrane in the vicinity of the nostrils, and the nasopalatine nerve (derived from Meckel's ganglion, which is connected with the superior maxillary division), which supplies the mucous membrane on the spongy bones and on the septum. Whatever may be the nature of the odorous matter, it is necessary that it should be transmitted by a respiratory current through the nostrils to the true olfactory region and dissolved or suspended in the fluid with which the olfactory membrane is normally covered. The proper condition of this fluid is one of the essential conditions of the perception of odors. If the membrane is too dry, or if there is an inordinate excretion of fluid from its surface (both of which conditions occur in catarrh or cold in the head), smell is impaired or lost, in consequence of the necessary penetration of the stimulating odor to the nervous filaments being prevented.

The sense of taste is often confounded with that of smell. We speak of tasting an odoriferous substance, such as an onion or a savory dish or a wine, when in reality we perceive it for the most part through the olfactory nerves. This is proved by the fact that the taste for these substances is lost when the smell becomes greatly impaired.

The acuteness of the sense of smell is far greater in many of the lower animals (dogs, e.g.) than in man, and they employ it in guiding them to their food, in warning them of approaching danger, and for other purposes. To civilized men the utility of this sense is comparatively small, but it is occasionally much increased when other senses are deficient. Among many savage tribes the sense is almost as acute as in many of the lower mammals.

Examination of the Nose. Many ingenious instruments and methods have been devised for the examination of the nasal cavities in health and disease. Previous to examination the mucous membrane may be shrunken and rendered anæsthetic by the application of cocaine and adrenalin (qq.v.). Examination through a speculum inserted into the nostril is called anterior rhinoscopy. The upper part of the pharynx and the back part of the nostrils with the cushion of the Eustachian tube (posterior rhinoscopy) are examined by means of a small mirror on a handle. (See LARYNGOSCOPE.) Another method is by using the nasopharyngoscope or pharyngoscope. These instruments are constructed on the same principle as the cystoscope (q.v.) and are inserted either through the nose or mouth and afford an excellent view of the parts. The presence of pus in the accessory nasal sinuses may be detected (independently of the symptoms) by transillumination with an electric light held in the mouth or against the floor of the frontal sinus, and X-ray photographs afford a means of still more exact diagnosis.

Diseases of the Nose. The nose is the port of entry for many infectious diseases, such as epidemic cerebrospinal meningitis, poliomyelitis, and influenza. The importance of nasal hygiene and the cure of local disorders is therefore great even from a prophylactic standpoint. Only a few of these diseases can be mentioned here. The nose may be congenitally malformed, but irregularities in its make-up result generally from injury or disease, more particularly from lupus or syphilis. Even extensive destruction of the soft parts can be measurably repaired by plastic operations, this type of operation being known as rhinoplasty. (See RHINOPLASTIC OPERATION.) Inflammation of the membrane of the nose is known as rhinitis (q.v.). The septum itself may be deviated or thickened, or the site of exostosis (the so-called spur), and may require straightening or resection. A recently devised operation, termed submucous resection of the septum, makes possible the removal of deviated portions of bone and cartilage without mutilation of the natural partition. Atrophic rhinitis, sometimes called ozena (q.v.) from the foul odor to which it gives rise, is characterized by extreme thinning of the mucous membrane and underlying submucous tissue, as well as alteration in the structure of the bone. Atrophic rhinitis is sometimes due to, or coexists with, empyema of the accessory nasal sinuses. Chronic purulent inflammation of these sinuses does not always produce atrophy, but it sometimes provokes the formation of polypi (see POLYPUS) in the region of the middle turbinated bone. On the other hand polypi may form independently of accessory sinus disease. Their presence results in varying degrees of nasal obstruction, loss of smell, attacks of sneezing, and a profuse watery discharge from the nostrils. Fracture of the nasal bones happens not infrequently, and it is of great importance that they be replaced as early as possible. If this is not done, permanent disfigurement occurs, and the septum, being bent and thickened, more or less obstruction to breathing supervenes. Diseases of the nasal accessory sinuses are peculiarly prone to affect the eyes. This is exemplified most forcibly in chronic inflammation of the sphenoid and ethmoidal sinuses, which are in close relation to the eyeball and frequently impair or even destroy vision.

Consult: W. L. Ballenger, *Diseases of the Nose, Throat, and Ear* (4th ed., Philadelphia, 1914); C. G. Coakley, *Manual of Diseases of the Nose and Throat* (5th ed., New York, 1914); W. B. Davis, *Development and Anatomy of the Nasal Accessory Sinuses in Man* (Philadelphia, 1914); Wright and Smith, *A Text-Book of the Diseases of the Nose and Throat* (New York, 1914); Otto Körner, *Lehrbuch der Ohren-Nasen- und Kehlkopf-Krankheiten* (5th ed., Wiesbaden, 1914).

NOSE, COMPARATIVE ANATOMY OF THE. In the ordinary usage of the word, no animals but mammals have noses; but in the widest sense of an organ of smell, the nose is found in all vertebrates and in some lower animals. Owing to the close relation that exists between the sense of taste and the sense of smell, it is impossible to determine beyond question the function of certain organs among the lower animals, but in several cases evidence has been produced to show that ciliated pits or patches have a function similar to, if not identical with, that of smell in vertebrates. Thus, as low as the ctenophores and some medusæ there occur special areas covered with cilia, to which the sense of taste or smell has been assigned. In many flatworms, in nemerteans, and in many true worms ciliated grooves, pits, and prominences occur which are certainly sensory and probably olfactory. Whether organs of smell occur among crustaceans and insects is not beyond doubt, but short processes, open at the point and with special nerve connections located on the antennæ, are regarded as organs of smell. There is much evidence in support of the belief that insects smell, and the antennæ are almost certainly the seat of whatever such sense they possess. Among echinoderms there are isolated cases of organs which may be olfactory, notably the sensory cups on the inner surface of the tentacles in *Synapta*. Among the mollusks the patches of densely ciliated epithelium in the mantle cavity known as osphradia are very probably organs of smell. In *Amphioxus* and the cyclostomes there is a single pit or sac lined with an epithelium consisting of ciliated and sensory (olfactory) cells. In the elasmobranch fishes the olfactory sacs lie on the under surface of the snout, but in all the vertebrates they are situated somewhere between the eyes and the end of the snout, on the upper surface.

In all animals above cyclostomes the nasal sacs are inclosed in cartilaginous or bony cases, forming a prominent part of the skull. The nostrils of bony fishes are divided into two parts by a septum, which is sometimes so wide as to give rise to four wholly distinct nostrils. The mucous membrane lining the nasal sacs of fishes is raised up into a number of complex radial folds, thus increasing the sensory surface. The dipnoid fishes differ from the other true fishes in that the nasal sacs communicate with the cavity of the mouth as well as with the exterior, just as they do in all higher vertebrates. In amphibians we find for the first time turbinal bones which serve to increase the sensory surface of the nasal cavities. There are also glands present in the sensory epithelium, serving to keep it moist. Moreover, there is a canal connecting the anterior angle of the orbit with the nasal cavity, known as the nasolachrymal duct, which is of use in conveying surplus lachrymal secretion (tears) into the nasal cavity and thence into the pharynx through the posterior nares. This duct is present in all the higher vertebrates also. In reptiles the olfactory organ is rather simple, especially in lizards and snakes; there is only a single turbinal, though crocodiles have on the outer side of the cavity a second prominence called the pseudoturbinal. Birds also have only a single true turbinal, but two pseudoturbinals are present, and the true turbinal is often more or less rolled on itself. In mammals the nasal cavity is large, and the turbinals are extended to form a spongy labyrinth, the projections of which, known as olfactory scrolls, are normally five in number, though they sometimes become more or less fused in pairs. Thus, there is sometimes one, but usually two, superior or upper turbinals, and there is usually one, but sometimes two, middle turbinals. The so-called superior and middle turbinals of man are somewhat different in their origin, but the inferior turbinal is derived from and corresponds to the single turbinal of reptiles and birds.

The external nose of mammals is formed by an extension outward of the nasal bones, supported and strengthened by a cartilaginous outgrowth of the ethmoid. The size and appearance of the nose depend chiefly upon its function, for it is often elongated for some special purpose.

NOSE APE. See Proboscis Monkey.

NOSEBLEED. See Epistaxis.

NOSELITE, nō′zel-īt (named in honor of K. W. Nose, a German chemist), or Nosean. A mineral made up of the sulphates and silicates of sodium and aluminium. It crystallizes in the isometric system, is translucent, and has a gray, blue, or brown color. It occurs in certain igneous rocks such as phonolite and nepheline syenite. It is found chiefly in Germany and on the Canary and Cape Verde Islands.

NOSOG′RAPHY. See Distribution of Diseases.

NOSKOWSKI, nŏs-kŏf′skē, Sigismund (1846–1909). A Polish composer, born at Warsaw. He studied piano under Feist, violin under Hornzeil, and theory under Kiel. In 1869 he was appointed assistant instructor in singing under Ciaffei and director of the Institute for Blind Children at Warsaw. It was in the latter position that he invented his successful notation for the blind. In 1876 he became musical director of the city of Constance and in 1881 conductor of the Musical Society of Warsaw, retaining the latter position till 1902 and greatly encouraging the younger composers by first performances. Four years later he was appointed conductor of the Warsaw Philharmonic Orchestra. His principal compositions are three operas, *Livia Quintilla* (1900), *Wyrok* (1907), *The Quarrel about the Boundary Wall* (1909); a fantastic ballet, *The Festival of Fire;* music to Kraschewski's drama, *The Cottage near the Village;* two cantatas, *Switezianka* and *The Year in Folk-Song;* three symphonies (in A, C minor, and F); a symphonic poem, *The Steppe* (1901); an overture, *Morskiesko;* variations, *Zzycia;* a piano quartet; and three string quartets. He edited (with Sigismund Gloger) a collection of folk songs, *Piesni ludu* (1892), and published two treatises on harmony and counterpoint (1902 and 1908).

NOSOL′OGY (from Gk. νόσος, *nosos,* disease + -λογία, *-logia,* account, from λέγειν, *legein,* to say). The branch of medical science which treats of the classification and nomenclature of diseases. The old idea was that diseases could be divided into classes, orders, genera, and species. Many systems have been proposed, used, and abandoned, as the systems of Sauvages, Linné, Vogel, Young, and especially of Cullen. Some of these have been based upon theories of causation, others upon the symptoms manifested, the part or system of the body affected, or the pathological effects observed. It is evident that no single scheme of classification will answer every purpose. It is equally obvious that every system must be subject to constant modification by the advances in medical knowledge. Among writers of the present day the tendency is towards a very simple classification.

The first system, for statistical purposes, was devised in 1837 by Dr. William Farr (q.v.), a distinguished medical statistician of London, its most complete development being the *Nomenclature of Diseases of the Royal College of Physicians,* of London, in 1884, latest revision (4th ed.) in 1906.

In the United States a committee of the American Medical Association prepared a nomenclature in 1872, but the work was discontinued. In 1902 the Census Bureau published a *Manual of International Classification of Causes of Death,* based upon the first decennial revision of the *International List of Causes of Death.* In the following year (1903) a nomenclature was compiled by Dr. R. J. Carlisle, Dr. W. Coleman, Dr. T. A. Smith, and Dr. E. L. Dow, all of New York, and published as the *Bellevue Hospital Nomenclature of Diseases and Conditions, etc.* (New York, revised in 1909 and entirely recast in 1911, when it was collocated with the second decennial *International List of Causes of Death*). This list had been put forward by the International Statistical Institute, the successor to the Statistical Congress, which congress, at its first session in Brussels in 1853, appointed Dr. W. Farr, of London, and Dr. M. d'Espine, of Geneva, to prepare a "report upon a classification of diseases that might be used in all countries for the statistics of causes of death." The classification was adopted in Paris in 1855, in Vienna in 1857, and was translated into six languages. Then followed revisions in 1864, 1874, 1880, 1886, and 1903. The International Statistical Institute succeeded the Statistical Congress, the first decennial revision was adopted in 1900 and the second in 1910, to be in force until 1920. Upon this second decennial revision the Census Bureau based the *Manual of the International List of Causes of Death* published in 1911, the most complete and correct list in existence. It contains the terms of the international list, terms in use in the United States, and terms of the *Nomenclature of Diseases of the Royal College of Physicians,* of London, and of the *Bellevue Hospital Nomenclature,* of New York. The work was also supported by the committee on the nomenclature of diseases appointed by the American Medical Association in 1910, whose chairman, the late Dr. Frank P. Foster, of New York, and Dr. C. L. Wilbur, of Washington, chief statistician of vital statistics of the Census Bureau, were especially instrumental in making the manual a success. Consult H. D. Rolleston, "Classification and Nomenclature of Diseases, etc.," in *Lancet* (London, May 23, 1909), and introduction to *Manual of the International List of Causes of Death* (Washington, 1911).

For anatomical terminology the Anatomical Society accepted in Basel in 1895, after six years of work, a list of some 5000 anatomical terms in correct Latin, giving only one name to each structure, thus doing away with the mass of synonyms and reducing a list of about 30,000 terms to 5000. This nomenclature has been called the BNA, the *Basel Nomina Anatomica.* Consult L. F. Barker, *Anatomical Terminology* (Philadelphia, 1907).

NOSSA SENHORA DO DESTERRO. See Florianopolis.

NOSSI BÉ, nŏs′sē′bā′, or Nosy-Be. An island off the northwest coast of Madagascar, from which it is separated by a narrow channel (Map: Africa, J 6). It has an area of 130 square miles, is volcanic and mountainous and well wooded. Parts of it are well cultivated and produce sugar cane, coffee, rice, and vanilla. The chief town is Hellville, on the south coast, an important port of call with shipping amounting to more than half a million tons annually. It has an excellent harbor, deep and safe, allowing large vessels to lie alongside the jetty, which is 815 feet long. It exports sugar, rum, tobacco, and cocoa. The island was ceded to France by Madagascar in 1840, and in 1896, when the latter became a French possession, Nossi Bé was placed under the authority of the Governor-General of Madagascar. Pop., 1906, 11,225.

NOSTAL'GIA (Neo-Lat., from Gk. *νοσταλγία*, from *νοσταλγεῖν*, *nostalgein*, to be homesick, from *νόστος*, *nostos*, return + *ἄλγος*, *algos*, grief, distress), Homesickness. A feeling of melancholy, caused by grief on account of absence from one's home or country. Nostalgia represents a combination of psychic and bodily disturbances and must be regarded as a disease. It may lead to melancholia and even death.

NOS'TOC (cf. Fr. *Nostoc*). A genus of blue-green algæ (Cyanophyaceæ, q.v.), characterized by being a simple filamentous colony in which the cells are rounded off, so that the colony resembles a string of beads. The most noticeable feature is the occurrence of heterocysts at intervals in the colony, cells which differ in contents and usually in size from the ordinary cells.

NOS'TRADA'MUS (Michel de Notredame) (1503–66). A French astrologer of Jewish descent, born at Saint-Remy in Provence. He studied at Avignon and medicine at Montpellier. During the pestilence of 1524–29 he went from city to city in the south of France, aiding the sufferers. He traveled for a number of years and in 1544 settled at Salon. The next year, when a new epidemic of the pest swept over the country, he was called to Aix and to Lyons. He treated his patients with a secret remedy that was credited with marvelous cures and gave him a great reputation. A few years later his claim that he had the power of reading the future attracted widespread attention. In 1550 he began to write his famous *Centuries*, mystic prophecies in rhymed quatrains, the first series published at Lyons in 1555. Catharine de' Medici invited their author to court, where he reached the height of his fame. Soon afterward he returned to Salon. From 1550 to his death he published an *Almanach* that had a wide circulation. Consult: Jaubert, *Vie de M. Nostradamus* (Amsterdam, 1656); Guynaud, *La concordance des prophéties de Nostradamus avec l'histoire* (Paris, 1693); Eugène Bareste, *Nostradamus* (ib., 1842).

NOS'TRILS (AS. *nosþyrl*, *næsþyrl*, from *nosu*, *nasu*, nose + *þyrl*, *þyrel*, hole, from *þyrel*, OHG. *durihhil*, *durchil*, perforated, from AS. *þurh*, OHG. *durnh*, Ger. *durch*, through), Diseases of the. This classification is no longer used, and diseases formerly appearing under this head will be found under their respective titles. (See Catarrh; Epistaxis; Nose; Ozena; Polypus; Rhinitis.) Foreign bodies are often inserted into the nostrils by children and become impacted. They may usually be extracted by a small scoop, a bent probe, or forceps. Such foreign bodies may be retained for a considerable time and set up a purulent discharge. Inflammation of the roots of the stiff hairs (vibrissæ) at the entrance of the nostril sometimes occurs and is known as folliculitis. Children are occasionally born with imperforate nostrils. This congenital malformation may, however, usually be remedied by surgical means.

NOSY-BE. See Nossi Bé.

NO'TABLES (OF., Fr. *notable*, from Lat. *notabilis*, noteworthy, from *notare*, to note, mark, from *nota*, mark, from *noscere*, to know; ultimately connected with Eng. *know*). The name given in France before the revolution of 1789 to persons of noble birth, social distinction, or political importance who were summoned to meet in the Assembly of Notables. The States-General (q.v.) was too great a check on the despotism of the monarchy, and beginning with Charles V the French kings adopted the expedient of calling in their stead Assemblies of Notables, composed of those who were likely to be in favor of the projects of the crown. Their whole proceedings were guided by the King or his ministers. They showed a particular readiness in granting subsidies, from which they themselves, as belonging to the privileged classes, were exempt. An Assembly of Notables, convened in Paris by Richelieu in 1626 and presided over by Gaston d'Orléans, brother of Louis XIII, consisted of only 35 members. In 1787, when the state of the finances threatened the country with bankruptcy, Louis XVI, at the instigation of Calonne (q.v.), had recourse to an Assembly of Notables, which assembled on Feb. 22, 1787. In spite of their readiness to accept certain reforms in the administrative and financial system, they showed themselves jealous of their ancient privileges and were inclined to shift the responsibility for the difficult state of affairs on the government. On May 25 the Notables were dismissed. Necker, who was later placed at the head of affairs, assembled the Notables for the last time on Nov. 6, 1788, to consult with them concerning the form in which the States-General should be convened. The Notables declared against every innovation which they had sanctioned the year previous and were especially opposed to the double representation of the Third Estate. This opposition compelled the court to resort to half measures, which helped to prepare the way for the Revolution. The Notables were finally dissolved Dec. 12, 1788. See France; French Revolution.

NOTAJO DA LENTINO, Il. See Lentino, Jacopo da.

NO'TARY PUBLIC (Lat. *notarius*, one who writes, from *nota*, mark). An officer duly authorized to attest or certify legal instruments and to perform certain other official acts, usually of a ministerial character. The office is created by statute, and the functions of a notary public vary in different jurisdictions. Notaries were known in England before the Conquest and in all the countries of Europe at an even earlier time. They were appointed by the popes at Rome and acted as officials in the ecclesiastical courts, in addition to exercising certain secular powers. In England the authority to appoint notaries was finally delegated by the Roman see to the Archbishop of Canterbury, and after the Reformation a statute was enacted (25 Hen. VIII, c. 21, § 4) confirming the right in the Archbishop as a high prelate in the English church.

With the development of the commerce of England and the law merchant the office of notary public increased in importance very rapidly. Notaries were employed to protest commercial paper, to witness certain papers under the maritime law, and were gradually vested with the powers which they exercise generally to-day.

In the United States notaries receive their appointments from the governors of the States, and the authority of a notary to act, therefore, does not extend beyond the limits of the particular territory in a State for which he is appointed. This territory is usually a county, and he cannot exercise his functions in another county unless he complies with certain prescribed formalities, such as filing a certificate and paying an additional fee. In many States a notary may thus extend his official powers to all the counties of his State, but he cannot exercise his powers except for the county in which he is personally present at any given time.

In general any male citizen is eligible to appointment as a notary. In most States, in order to qualify, a notary must take an oath of office, and in some he must give a bond to secure the faithful performance of the duties of his office; and a breach of his official duties is punished criminally. A notary's seal must be affixed to many legal instruments authenticated before him. The statutes of the different States vary as to the necessity of a notarial seal.

As notaries are State officers, their acts in matters in which the Federal government is involved are not valid, with the exception of those cases where their authority is specially recognized by act of Congress. Federal statutes provide that a notary may administer all oaths and take all acknowledgments which a justice of the peace may do, and the authority of notaries to take depositions, affidavits, etc., for use in the United States courts is also expressly authorized. The notarial seal must be affixed to all documents intended to be used in the courts or any department of the Federal government.

The general powers of a notary as a State officer are as follows: to take acknowledgment of legal instruments, such as deeds, mortgages, bills of sale, etc.; to take affidavits; to take depositions (see DEPOSITION); to protest commercial paper; and in some States to exercise the powers of a justice of the peace.

A notary may be disqualified to act by reason of his financial interest in a matter brought before him. Thus, where a notary is a grantee in a deed, he cannot take the acknowledgment of the grantor or person conveying the property. Relationship to one of the parties to a deed or other legal instrument will not ordinarily disqualify a notary from taking the acknowledgment of that party, as it is a ministerial act; but where the notary is commissioned to take depositions, it is considered more in the nature of a judicial act, and if he is a near relative to one of the parties to the suit, in most jurisdictions he is disqualified for that reason. The fees of notaries are fixed by statute in each State, and generally it is a misdemeanor for a notary to demand and receive more than the statutory fee for an act. By statute in most jurisdictions certain other officials, such as judges, justices of the peace, mayors of cities, etc., are vested with notarial powers. Consult: J. O. Skinner, *Handbook for Notaries Public and Commissioners of Deeds of New York* (New York, 1912); R. Brooke, *Treatise on the Office and Practice of a Notary of England* (7th ed., Toronto, 1913); B. F. Rex, *Notaries' Manual* (6th ed., Kansas City, 1913). See ACKNOWLEDGMENT; AFFIDAVIT; EVIDENCE.

NOTA'TION (Lat. *notatio*, designation, from *notare*, to mark, from *nota*, mark). In arithmetic, a term applied to a system of designating numbers by figures, or *notæ* as they were often called in the Middle Ages. The chief number notations of the early races, before the perfecting of the position system, conform to one of three systems, the repeating, the alphabetic, and the initial-letter systems, although these are not mutually exclusive. By the repeating system is meant the plan of repeating a chosen symbol, especially for 1, 10, 100—on the additive principle, so as to represent other numbers twice or three or more times as great. Thus, in the Egyptian system the symbol 𓎆 stands for 10, and the combination 𓎆𓎆𓎆 stands for 30. By the alphabetic system is meant the plan of representing numbers by letters in alphabetic order. And by the initial-letter system is meant the plan of representing numbers by the initial letters of the corresponding language forms. These tendencies are exhibited in the following tables:

REPEATING SYSTEMS

Egyptian	𓏺, 𓎆, 𓍢, ---
Babylonian	𒁹, 𒌋, 𒁹𒀸, ---
Early Greek	I. Δ, H, M, ---
Early Roman	I, X, ⊖, ↀ, ---
Late Roman	I, X, C, M, ---

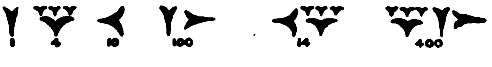
ALPHABETIC AND INITIAL-LETTER SYSTEMS

Hebrew	א, ב, ג, ד,
Late Greek	α, β, γ, ——

The Hebrew system was used as late as the twelfth century, and to it was added the zero after contact with the Arabic system.

Among the Egyptians numbers were written running from right to left in the hieratic writing, with varying direction in the hieroglyphics. In the latter the numbers were either written out in words or represented by symbols for each unit, repeated as often as necessary. In the hieratic symbols the figure for the unit of higher order stands to the right of the one of lower order. The Phœnician system contained 22 characters, possibly derived from the symbols of the Egyptians.

The Babylonian cuneiform inscriptions proceed from left to right, which must be looked upon as exceptional in a Semitic language. The units of higher order stand at the left of those of lower order. The symbols used in writing are chiefly a horizontal wedge, a vertical wedge, and a combination of the two at an angle, but they varied at different periods. The symbols were written beside one another or, for ease of reading and to save space, over one another. The symbols for 1, 4, 10, 100, 14, 400 respectively are as follows:



For numbers exceeding 100 there was also used, besides the mere juxtaposition, a multiplicative principle; the symbol representing the number of hundreds was placed at the left of the symbol for hundreds, as in the case of 400, already shown. The Babylonians probably had no symbol for zero in our sense, although they had a symbol to indicate the absence of number, as we might indicate the absence of minutes in expressing time.

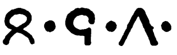
The oldest Greek numerals (aside from the written words) were, in general, the initial letters of the fundamental numbers, Π for 5 (πέντε), Δ for 10 (δέκα), and these were repeated as often as necessary. These numerals are described by the Byzantine grammarian Herodianus (c.200 A.D.) and hence are spoken of as Herodianic numbers. Shortly after 500 B.C. two new systems appeared. One used the 24 letters of the Ionic alphabet in their natural order for the numbers from 1 to 24, but apparently only for recording numbers, not for any purposes of operations. The other arranged these letters apparently at random, but actually in an order fixed arbitrarily; thus, $\alpha = 1$, $\beta = 2$, ..., $\iota = 10$, $\kappa = 20$, ..., $\rho = 100$, $\sigma = 200$, etc. For 6, 90, and 900 exception was made, and the symbols ϛ ϙ ϡ were used respectively. Here, too, there is no special symbol for the zero.

The Roman numerals were probably inherited from the Etruscans. The noteworthy peculiarities are the lack of the zero; the subtractive principle whereby the value of a symbol was diminished by placing before it one of a lower order (IV = 4, IX = 9, XL = 40, XC = 90), even in cases where the language itself did not signify a subtraction; and finally the multiplicative effect of a bar over the numerals ($\overline{\mathrm{XXX}} = 30{,}000$, $\overline{\mathrm{C}} = 100{,}000$). The subtractive principle is found, however, among the Babylonians, so that it was not original with the Romans. Also for certain fractions there were special symbols and names. According to Mommsen the Roman number symbols I, V, X represent the finger, the hand, and the double hand, but they are more probably from old Etruscan cancellation forms (crossing off 10 marks for X and taking half of this for V or Λ) or possibly from some kind of letter forms. The use of the bar (vinculum or titulus) was very uncertain. Thus, in the tenth century we find it used over the I and X (as among later Romans) to increase the value 1000-fold, but over the M it had no significance. The symbols, too, were carelessly used. Thus, in one manuscript $\underline{\mathrm{X}}\ \overline{\mathrm{I}}\overline{\mathrm{I}}\ \overline{\mathrm{M}}\ \overline{\mathrm{M}}$ is used to mean 10×1000^4 and C $\overline{\mathrm{M}}$ to mean 100×1000. The subtractive principle, although known to the later Romans, was little used until very recently, as witness IIII for IV, continued from the early clock faces to those of to-day.

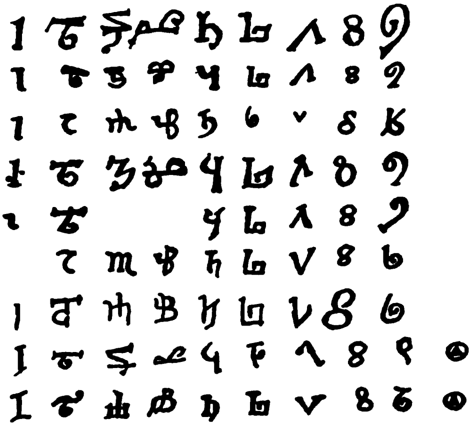
The number system of the Hindus is of special interest, because it is to these Aryans that we owe the valuable position system now in use. It was at one time thought that their oldest symbols for the numbers from 4 to 9 were merely the initials of their number words, but this theory has never been substantiated. The first nine symbols can be traced back to the second or third century B.C. in India. The zero is of later origin, and its introduction is not proved with certainty until after 400 A.D. The writing of numbers was carried on, chiefly according to the position system, in various ways. One plan, which Aryabhatta records, represented the numbers from 1 to 25 by the 25 consonants of the Sanskrit alphabet, and the succeeding tens (30, 40....100) by the semivowels and sibilants. A series of vowels and diphthongs formed multipliers consisting of powers of ten, *ga* meaning 3, *gi* 300, *gu* 30,000, *gau* 3×10^{16}. In this there is no application of the position system, but it appears in two other methods of writing numbers in use among the arithmeticians of southern India. Both of these plans are distinguished by the fact that the same number can be made up in various ways. The first method consisted in allowing the alphabet, in groups of nine symbols, to denote the numbers from 1 to 9 repeatedly, while certain vowels represented the zeros. If in the English alphabet, according to this method, the numbers from 1 to 9 are denoted by the consonants *b*, *c*, ..., *s*, so that after two countings one finally has $s = 2$, and zero is denoted by every vowel or combination of vowels, the number 60502 might be indicated by *siren* or *heron* and might be introduced by some other words in the text. The second method employed type words. Thus, *abdhi* (one of the 4 seas) = 4, *surya* (the sun with its 12 houses) = 12, *açvin* (the two sons of the sun) = 2. The combination *abdhisuryaçvinas* denoted the number 2124.

In the eighth century (c.772) the Arabs, whose numerals consisted of abbreviated number words of an inferior type, the divani, became acquainted with the Hindu system. From these figures there arose, among the Western Arabs, the gobar numerals (dust numerals), perhaps because they were written on the dust board (abacus). These gobar numerals, almost entirely forgotten to-day among the Arabs themselves, influenced the forms of our modern numerals. These primitive Western forms used in the abacus calculation are found in the West European manuscripts of the tenth and eleventh centuries and owe much of their prominence to Gerbert, afterward Pope Sylvester II (q.v.), and to Leonardo Fibonacci (q.v.).

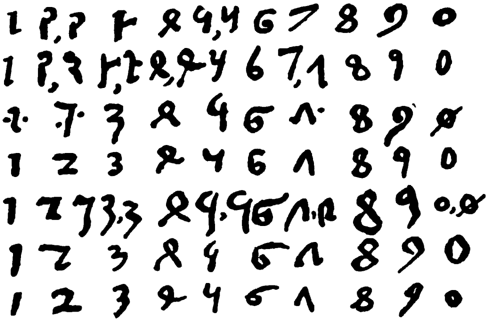
The arithmetic of the Western nations, cultivated to a considerable extent in the cloister schools from the ninth century on, employed, besides the abacus, the Roman numerals, and consequently did not use a symbol for zero. In Germany, up to the year 1500, the Roman symbols were called German numerals, in distinction from the symbols of Arab-Hindu origin, which included the zero (Ar. *as-sifr;* Skt. *sunya*, the void). The latter were called ciphers (*Ziffern*). From the fifteenth century on these Arab-Hindu numerals appear more frequently in Germany on monuments and in churches, but at that time they had not become common property. A frequent and free use of the zero in the thirteenth century is shown in tables for the calculation of the tides at London and of the duration of moonlight. In the year 1471 there appeared in Cologne a work of Petrarch with page numbers in Hindu figures at the top. In 1478 the first printed arithmetic appeared at Treviso, and in 1482 the first German arithmetic at Bamberg, and these explained the system. Besides the ordinary forms of numerals everywhere used to-day, the following forms for 4, 5, 7 were common at the time of the struggle between the Roman and Hindu notations:



Some of the early forms which appear chiefly in the mediæval copies (about the twelfth century) of the works of Boëthius, the numerals very likely being interpolations, are as follows:



The following are typical forms found in manuscripts of the twelfth to the fifteenth century:



In the sixteenth century the Hindu position arithmetic and its notation first found complete introduction among all the civilized peoples of the West. By this means was fulfilled one of the indispensable conditions for the development of common arithmetic in the schools and in the service of trade and commerce.

Scales of Notation. The explanation of the fact that 10 is almost everywhere found as the base of the system of counting is seen in the common use of the fingers in elementary calculations. In all ancient civilizations finger reckoning was known, and even to-day it is carried on among savage peoples. It is evident that any integer above one may be made the base of a scale of notation, the number of symbols being the same as the number of units in the base. Some languages contain words belonging fundamentally to the scales of 5 and 20, without these systems having been completely elaborated. In the Roman and Babylonian systems 12 and 60 appear as partial bases. The native New Zealanders had a scale of 11, their language possessing words for the first few powers of 11, and consequently 12 is represented as 11 and 1, 13 as 11 and 2, 22 as two 11's, and so on. (See NUMERATION.) What has been said concerning the development of the number symbols illustrates the power of a well-arranged number system and its necessity for progress in mathematical science. For reasons already stated, the world has generally adopted the decimal notation. In this system each place has a value tenfold that of the place at its right, the general form of the integers being $10^n \cdot m + 10^{n-1} \cdot l + \ldots . 10^3 \cdot d + 10^2 \cdot c + 10b + a$, and that of the fractions being $10^{-1} \cdot a' + 10^{-2} \cdot b' + 10^{-3} \cdot c' + \ldots . 10^{-n} \cdot m'$. The decimal fraction was a relatively late development of the system. During the Middle Ages the sexagesimal fractions (see FRACTION), inherited from the later Greeks, had been generally used by physicists and astronomers and had therefore received the names "physical" and "astronomical fractions." We have the remains of the system in our degrees, minutes, and seconds, and in our method of indicating time. The mediæval fractions were not limited to seconds, however, but extended to thirds, fourths, and so on. For example, 12° 5′ 3″ 16‴ 18^{IV} means in modern symbols $12 + \frac{5}{60} + \frac{3}{60^2} + \frac{16}{60^3} + \frac{18}{60^4}$. To distinguish the fractions of trade from the *fractiones astronomicæ*, the former were called *fractiones vulgares*, from which come the English vulgar fractions and the American common fractions.

The constant advance of science, calling for larger numbers and more elaborate fractions, finally demanded some improvement on the sexagesimal system. As early as the latter part of the fifteenth century some indications of the approach of the decimal fraction are seen. During the sixteenth century several efforts were made in the same direction, notably that by Stevin (q.v.). But it was the advent of logarithms at the opening of the seventeenth century that made the necessity apparent and gave to decimal fractions a general recognition in the scientific world. It was, however, fully a century later before they began to be recognized in business; the establishment of the metric system (q.v.) and the decimal coinages of the various countries finally compelled their general use. A comparison of the three systems is seen in the following representation of one-tenth: $\frac{1}{10}$ (common), 0.1 (decimal), 6′ (sexagesimal).

Index notation may also be mentioned as a recent example of the power of symbolism. Astronomers and physicists, having to employ both exceedingly large and exceedingly small numbers in calculation, find it advantageous in approximations to introduce powers of 10. Thus, 284,000,000,000 may be expressed by $284 \cdot 10^9$, and 0.00000000035 by $3.5 \cdot 10^{-10}$. If these numbers are to be multiplied, the process is simply $284 \times 3.5 \times 10^{9-10}$ or $994 \cdot 10^{-1} = 99.4$.

Bibliography. Woepcke, *Sur l'introduction de l'arithmétique indienne en Occident* (Rome, 1859); Pihan, *Exposé des signes de numération usités chez les peuples orientaux* (Paris, 1860); "Mémoirs sur la propagation des chiffres indiens," in *Journal Asiatique* (6th series, part i, ib., 1863); Friedlein, *Die Zahlzeichen und das elementare Rechnen der Griechen und Römer* (Erlangen, 1869); Treutlein, *Geschichte unserer Zahlzeichen* (Karlsruhe, 1875); Cantor, *Vorlesungen über Geschichte der Mathematik* (Leipzig, 1880; 2d ed., 1894); Unger, *Die Methodik der praktischen Arithmetik* (ib., 1888); Smith and Karpinski, *The Hindu-Arabic Numerals* (Boston, 1911), with a full bibliography and numerous illustrations.

NOTATION, MUSICAL. See MUSICAL NOTATION.

NOTE (OF., Fr. *note*, from Lat. *nota*, mark). In music, a character which by the degree it occupies on the staff represents a sound, and by its form the period of time or duration of that sound. The notes commonly in use in modern music are the semibreve, 𝅝; minim, 𝅗𝅥; crotchet, 𝅘𝅥; quaver, 𝅘𝅥𝅮; semiquaver, 𝅘𝅥𝅯; demisemiquaver, 𝅘𝅥𝅰; and semidemisemiquaver, 𝅘𝅥𝅱. Taking the semibreve as a unit, the minim is $\frac{1}{2}$ its duration, the crotchet $\frac{1}{4}$, the quaver $\frac{1}{8}$, the semiquaver $\frac{1}{16}$, the demisemiquaver $\frac{1}{32}$, and the semidemisemiquaver $\frac{1}{64}$. Notes of greater length than the semibreve were formerly in use—viz., the breve, twice the duration of the semibreve; the long, four times; and the large, eight times the semibreve. Of these, the breve, ▭ or 𝅜, is still sometimes met with in ecclesiastical music. According to their numerical proportions it is customary to speak of notes as whole, half, quarter, eighth, sixteenth, etc. See MUSICAL NOTATION.

NOTE, IN LAW. See PROMISSORY NOTE.

NOTHING TO WEAR. A humorous poem by William Allen Butler (q.v.), which appeared anonymously in *Harper's Weekly* in 1857.

NOTHNAGEL, nōt′nä′gel (CARL WILHELM) HERMANN (1841–1905). A German physician and medical writer, born in Alt-Lietzegoericke, Brandenburg. He received his medical education at the Friedrich-Wilhelms Institute at Berlin (M.D., 1863) and served as military surgeon in Königsberg (where he became privatdocent in 1866), in Berlin, and in Breslau. In 1872 he was called to Freiburg as professor of pharmacology, in 1874 to Jena as professor of medicine, and in 1882 went to Vienna. Nothnagel was an industrious writer, especially on pharmacology, physiology, and pathology, several of his works being translated into English, and he edited a *Handbuch der speziellen Pathologie und Therapie* (24 vols., 1894–1905; Eng. trans., *Encyclopedia of Practical Medicine*, 1901–05).

NOTHOMB, nô′tôN′, JEAN BAPTISTE, BARON (1805–81). A Belgian statesman and diplomat, born at Messancy, Luxemburg. He studied law at Liége and entered politics in Brussels as a contributor to the *Courrier des Pays-Bas*. He played an important part in the revolution of 1830 and in November of that year was appointed by the provisional government a member of the Diplomatic Committee. In 1837 he received the portfolio of Public Works, and in that department founded the Belgian railway system, and in 1841 became Minister of the Interior. He formed a new cabinet in 1843, but his moderate policy was not long successful, and he was forced to retire by the coalition of 1845. He was Minister at Berlin from 1845 until his death, and he received his title of nobility in 1852. His chief works include *Essai historique et politique sur la révolution belge* (1833; 4th ed., 1876). Consult Juste, *Le baron Nothomb* (Brussels, 1874).

NO′TICE (Lat. *notitia*, knowledge, idea, from *noscere*, to know). Notice in law denotes existing knowledge of a fact based upon information communicated by another, which knowledge has the effect of fixing the rights and liabilities of the party giving and the party receiving the information. The term is also sometimes applied to the act of giving the information which constitutes the notice. Notice may be either (*a*) actual or (*b*) constructive.

Actual notice is knowledge of a fact based upon information communicated by either written or spoken language.

Constructive notice is knowledge which may not in fact exist, but which the law may presume to exist upon grounds of policy, as where notice to an agent is deemed to be notice to the principal, although in fact the information is never communicated to the principal; or where notice of pendency of action affecting real estate is constructive notice of the action to any one dealing with the title to the real estate, whether he has in fact notice of the action or not (see LIS PENDENS); or where notice to the purchaser of negotiable paper of facts by which he is "put upon inquiry" as to its validity may be constructive notice of a defense of the maker to any action founded upon the paper; or where one accepting a conveyance containing a reference to some other deed is deemed to have constructive notice of the contents of such deed, although he may never have read it.

The doctrine of notice as a means of fixing rights and liabilities has many applications at common law. Thus the liability of an indorser of negotiable paper, or of a promissory note, or a bill of exchange is fixed by a notice of dishonor. The notice in order to charge an indorser must be given with due dispatch after dishonor or protest, usually on the day following; it must prescribe the bill or note and the nature of the dishonor. It may be oral, although usually in writing, and may be served personally or by mail. If the holder or prior indorser is unable after due diligence to find the indorser or serve him with notice, necessity of notice to charge the indorser is dispensed with. See NEGOTIABLE INSTRUMENTS.

In general any one purchasing property with actual notice of any equitable claims or rights that there may be with respect to the property, or with notice of facts sufficient to put him upon inquiry, takes the property subject to such claims; as, e.g., an equitable defense to negotiable paper, or fraud in the contract by which the vendee obtained title to the property, although a purchaser for value without notice would acquire the property free of claims. See FRAUD.

Notice by the landlord is necessary to terminate the tenancy of a tenant from year to year and in a few States of a tenant at will. In the former case the landlord is required by the common law to give at least six months' notice before the end of any year of his election to terminate the lease. This or a shorter period of time is now fixed by statute in some States. The landlord may, however, waive his right acquired by notice given and continue the tenancy by expressly giving his consent or by continuing to accept payment of rent.

When a creditor assigns his claim against his debtor without notice to the debtor, the debtor may discharge the debt by paying to the creditor the amount due. If, however, the assignee give the debtor notice of the assignment, the debtor is bound to pay the assignee; and if he pays the assignor, notwithstanding the notice to pay the assignee, he may nevertheless be compelled to pay the amount over again to the assignee. See ASSIGNMENT.

The right of an insured to abandon the property insured to the insurer upon the happening of a partial loss is fixed by notice given by the insured to the insurer. If a proper case for abandonment, the mere giving of notice is sufficient. If not a proper case for abandonment, the insured may not abandon unless the notice is accepted by the insurer. See INSURANCE.

Whether notice must be personally served upon the person to be notified depends upon the particular kind of notice. In general all notices, except those required in the course of litigation, must be personally served. Notice required between litigants may be served upon the attorneys in the case. When notice is required by statute, it must be served upon the person to be notified, unless otherwise specified in the statute. When the giving of notice is a condition precedent to creating a legal liability, a plaintiff seeking to enforce the liability must allege the giving of notice in his declaration or complaint. And in general it may be said that the party relying upon notice as a part of his cause of action or defense must plead and prove it. When, however, the notice is in the nature of a condition subsequent, it is not a part of the pleader's cause of action and need not be pleaded by him. See PLEADING. Consult: W. P. Wade, *Treatise on the Law of Notice as Affecting Civil Rights and Remedies* (2d ed., San Francisco, 1886); Bennett, *Treatise on the Law of Lis Pendens* (Chicago, 1887); W. R. Bierly, *Time and Notice in Practice* (Philadelphia, 1904). See JUDICIAL NOTICE.

NOT'KER. The name of several monks of the Swiss monastery of Saint-Gall, of whom two are worthy of note.—NOTKER BALBULUS (c.840–912) did much for Church music by perfecting the sequence (q.v.). More than 30 melodies and about 40 arrangements of words are ascribed to Notker, who was canonized in 1513.—NOTKER LABEO, the Thick-Lipped (c.950–1022), was a great teacher, and it is probably to his school rather than to him individually that we should ascribe the many translations which bear his name. Among these are versions in German of Boëthius' *On the Consolation of Philosophy*, Aristotle's *Categories*, and the Latin Psalter. These works have great value from the philological point of view as examples of Old High German. They are edited by Paul Piper, *Notkers und seiner Schule Schriften* (1883–84). Consult J. Kelle, *Die Sankt Galler deutschen Schriften und Notker Labeo* (Munich, 1888).

NOTO, nō'tō. An episcopal city in the Province of Syracuse, Sicily, 17 miles south-southwest of the city of Syracuse and 3 miles from the Ionian Sea (Map: Italy, E 6). It is a handsome town with several rich churches and beautiful palaces and broad straight streets. Its academy has a library and a collection of antiquities. A trade is carried on in corn, wine, and oil. Noto was built in 1703 near the site of the older town of Notovecchio (the ancient Netum), destroyed by an earthquake in 1693. Pop. (commune), 1901, 22,564; 1911, 31,625.

NO'TOCHORD (from Gk. *νῶτος, nōtos*, back + *χορδή, chordē*, cord). A cellular, cartilage-like rod, arising in the embryo as an axial thickening of the hypoblast. It forms the basis of the vertebral column, i.e, the segmented axial skeleton of vertebrate animals. It is composed of a peculiar form of cellular tissue, called notochordal tissue, formed of large vacuolated cells extending from side to side of the notochord and having the nuclei confined to its dorsal and ventral regions. Around these tissues is a notochordal sheath of connective tissue, which is produced dorsally into a canal for the nervous system. In all except the lower vertebrates, *Amphioxus* (q.v.), lampreys, sharks, and certain armored fishes, the notochord is a transitory embryonic structure, replaced later by the permanent vertebral column. Its presence in embryonic or adult structures is the primary characteristic of the phylum Chordata (q.v.); and the traces of it in ascidians, *Balanoglossus*, etc., led to the inclusion of those wormlike forms in this phylum as Adelochorda and Urochorda. See Plate of ASCIDIANS.

NOTOGÆA, nō'tō-jē'ȧ (Neo-Lat., from Gk. *νότος, notos*, south + *γαῖα, gaia*, earth). A term in zoögeography used as the name of a great faunal region in two different senses: (1) as embracing the whole Southern Hemisphere except Africa, and opposed to Arctogæa, or the Holarctic region; and (2) as the equivalent of Neotropical region (q.v.; see also DISTRIBUTION OF ANIMALS). The first use of the term was proposed by Huxley in 1868, to reconcile certain striking resemblances between Australasia and South America—such, e.g., as the presence of marsupials in both, and not elsewhere; he also applied the synonymical name Austro-Columbian region. The implication of this collocation in the same category of two continents, now so remote from each other, was that in ancient times there was a land connection between them.

The secondary use of Notogæa for South and Central America and the Antilles has not come into general use; nor has the term Dendrogæa, proposed by Sclater.

NO'TONEC'TA. See WATER BUG.

NOTOR'NIS (Neo-Lat., from Gk. *νότος, notos*, south + *ὄρνις, ornis*, bird). A genus of large flightless rails or gallinules now nearly extinct. Only one living species is known, *Notornis mantelli*, of the southern island of New Zealand, which was first described by Owen from remains found with those of various moas. A living specimen, however, was taken in 1849, a second in 1851, a third in 1879, and a fourth, now well preserved at Dunedin, New Zealand, in 1898. A second, purely white species has become extinct within historic times on Norfolk Island, a single skin in Vienna being its sole remnant, and the bones of two other extinct species have been found. See EXTINCT ANIMALS; FLIGHTLESS BIRDS.

NOTOS'TRACA (Gk. *νῶτον, nōton*, back + *ὄστρακον, ostrakon*, baked clay, pottery, earthenware = [hard]shell). This order of the branchiopod crustaceans, which is represented by a few living genera, is remarkable in that it contains fossil forms which lived in the Middle Cambrian period, as shown by recent discoveries of the fossils in the Stephen formation of British Columbia. The early forms possess a wonderful degree of development and variety of structure for their period, yet their primitive character is revealed by the simple carapace, the vestigial antennæ, and the large number of trunk limbs. See STEPHEN FORMATION.

NOTOSUCHUS, nō'tō-sū'kŭs (Neo-Lat., from Gk. *νότος, notos*, south + *σοῦχος, souchos*, sort of crocodile). A small unarmored crocodile found fossil in Patagonian formations regarded as of Cretaceous age. It had a short, broad skull, blunt nose, mesosuchian palate, and the teeth few, small (except the unusually large canines), and laterally compressed.

NO'TOTHE'RIUM (Neo-Lat., from Gk. *νότος, notos*, south + *θηρίον, thērion*, dim. of *θήρ, thēr*, wild beast). A fossil marsupial mammal of the suborder Diprotodontidæ, found in the Pleistocene beds of Australia. See Diprotodon; Mammalia.

NÔTRE, nō′tr′, André le. See Le Nôtre, André.

NOTRE DAME (nō′tr′ dȧm) **DE PARIS**, Cathedral of. A church in Paris, the most celebrated among the many churches dedicated to the Virgin in France. It is situated in the Ile de la Cité, upon the site of a temple of Jupiter Ceraunus where a church was erected in 375. In the sixth century there were two churches there, dedicated to St. Stephen and the Virgin. Childebert rebuilt the latter about 520 in a "Roman" (i.e., basilican) style, considered very grand. The first glass window now known of in France was placed in it. Fragments of mosaic and precious marbles supposed to be from the floor and columns of this church were discovered in excavations in 1847 and are now in the Musée de Cluny. This church was pillaged and partly destroyed by the Normans in 857, but it was repaired by Bishop Anseric. In 1140 the abbot of Saint-Denis put in a glass window of great beauty. It was then called the *église neuve*, to distinguish it from Saint-Etienne, called *le vieux*. In the twelfth century both were falling into ruins, though they had for centuries been used for the great religious ceremonies and royal pageants of France.

About 1160 Bishop Maurice de Sully resolved to replace both old churches with a single edifice worthy of the capital of the Kingdom, and in 1163 the foundation of the present majestic pile was begun, its corner stone being laid by Pope Alexander III, then a refugee in France. The choir was the first part begun and the work was pushed rapidly, so that in 1182 the great altar was consecrated by a legate of the Pope. In 1185 Heraclius, Patriarch of Jerusalem, came to Paris to officiate with the Bishop in the dedication of the choir. Henry II, King of England, was interred before its high altar in August, 1189. The choir, transepts, and adjoining bays of the nave were completed in about 1196. The lower part of the nave was then run out to the main façade, which, with its two towers and three portals, was only begun by Bishop Pierre de Nemours in 1208. The portal of the south transept façade was built still later, as shown by an inscription of the architect Jean de Chelles, who began work upon it in 1257, in the reign of St. Louis. The chapels in the rear of the transepts were not a part of the original design, but were added in the last part of the thirteenth century, about which time, also, the towers of the west front were completed. In 1699 Louis XIV was seized with the ambition to place in the cathedral an altarpiece in the Renaissance style, and removed the original altar to give place to it. Other alterations were made by Soufflot in 1771–78. During the Revolution the statues of the old kings of France, which were upon the gallery of the main façade, were destroyed, and in 1793 the cathedral became, by law of the Revolutionists, the temple of Reason. Victor Hugo's literary masterpiece, *Notre Dame de Paris* (1830), attracted popular attention to the venerable edifice, and in 1845–55 it was subjected to a thorough and successful restoration, under the architects Lassus and Viollet-le-Duc. From 1182 to the present its nave, its altars, and its chapels have been the scenes of the most important ceremonies of church and state in France.

The architecture is the noblest expression of simple early Gothic before its richer flowering in Amiens, Rheims, and Bourges cathedrals, and for simple majesty of expression its façade has no superior in France. The plan of Notre Dame is exceedingly compact; there is no break in the line of radiating chapels in the choir, and the transepts do not project beyond the chapels. The inner narthex, of a double bay, is beneath the line of towers; the body of the church consists of a high central nave and four aisles flanked by an outer continuous line of chapels and cut by transepts almost in the centre. The sexpartite vaulting is superb in execution. Heavy round pillars and a high triforium gallery characterize the interior. The beginnings of tracery are illustrated by its lack in the earliest parts at the choir end and by its use in simpler forms in the windows and details of nave and façades. The portals, instead of projecting from the façade, as in the more developed cathedrals, are recessed in its mass. One tympanum is an interesting survival of the earlier church (c.1140), the rest, barring restorations, dating from between 1215 and 1225. The extreme length of the cathedral is 430 feet; width at transept, 170 feet; across nave and aisles, 124 feet; area covered by it, 64,108 square feet; height of towers, 223 feet; height of vault, 108 feet. The adjoining sacristy, a modern structure by Viollet-le-Duc, contains many rich treasures of ecclesiastical art. Consult: Sylvain François, *La façade de Notre-Dame de Paris: étude d'art* (Brussels, 1907); Marcel Aubert, *La Cathédrale Notre Dame: notice historique et archéologique* (Paris, 1909); Victor Hugo, *Notre Dame de Paris* (Eng. trans., New York, 1910).

NOTRE DAME DU LAC, dụ lȧk′, University of. A university for higher education under Roman Catholic auspices at Notre Dame, Ind. (founded 1842, chartered 1844). The university includes schools of arts and letters, science, engineering, journalism, commerce, pharmacy, architecture, and law. In connection with the university there is also a series of preparatory schools that carry students through the grade of high-school work. Practically all students live in dormitories on the campus. Notre Dame is said to be the largest boarding school in America. It is almost entirely without endowment, but is conducted by the Congregation of the Holy Cross, whose members devote themselves without pay to the work of higher education. (See Holy Cross, Congregation of the.) In 1914 the total attendance in all departments was 1077 and the faculty numbered 84. The library contains about 65,000 volumes. The college property was valued at $3,000,000, of which $2,200,000 was represented by the buildings and grounds. The president in 1915 was Rev. John Cavanaugh, C.S.C.

NOTREDAME, Michel de. See Nostradamus.

NOTT, Eliphalet (1773–1866). An American educator, born at Ashford, Conn. He was left an orphan at an early age and had to earn his own support while striving for an education. Nevertheless he received the degree of A.M. from Brown University in 1795 for study privately conducted, and the same year was licensed to preach. He was missionary and school teacher at Cherry Valley, N. Y., in 1796–97 and pastor of the Presbyterian church in Albany (1798–1804). In the latter year he was elected presi-

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dent of Union College at Schenectady, N. Y., and filled the position for more than 62 years. He found the college without funds, buildings, or library, and in debt, but he soon provided for its needs, and during his presidency more than 4000 students received degrees. He possessed no small mechanical genius, and among about 30 patents granted to him was one for the first stove to burn anthracite coal. He was considered one of the most finished pulpit orators of his time. Besides sermons, addresses, etc., he published *Counsels to Young Men* (1810) and *Lectures on Temperance* (1847). Consult his *Life* by Van Santvoord, revised by Tayler Lewis (New York, 1876).

NOTT, Josiah Clark (1804–73). An American physician and ethnologist, born in Columbia, S. C. He graduated at the South Carolina College (1824) and at the University of Pennsylvania (M.D., 1827), practiced in Columbia, spent a year in the hospitals of Paris, and later settled at Mobile, where in 1858 he founded a medical school, which became a part of the University of Alabama. He served for a time on the staff of the Confederate General Bragg (q.v.) during the Civil War. He was much interested in ethnology and kindred sciences, and published, besides many contributions to medical journals and other periodicals: *Two Lectures on the Connection between the Biblical and Physical History of Man* (1849); *The Physical History of the Jewish Race* (1850); *Types of Mankind* (1854); *Indigenous Races of the Earth* (1857). The last two books, written in conjunction with George R. Gliddon (q.v.), aimed to disprove the unity of the human race. Some of Nott's theories have been severely criticized, and they are perhaps more original than profound.

NOTT, Sir William (1782–1845). An English soldier, born near Neath, Glamorganshire. He went to Calcutta as a cadet in the Bengal army in 1800 and by 1825 was in command of a native regiment. After the first Afghan War broke out in 1838 he had charge of the troops at Quetta (1839), captured Khelat (1840), and in 1842 defeated the Afghans near Kandahar and drove them out of Baba Wali Pass. Later he occupied the fortress of Ghazni and having joined Sir George Pollock's force at Kabul, retired to India. Nott was appointed Resident at Lucknow in December, 1842, and was made G.C.B. in 1843. In the latter year he returned to England. His memoirs were published in 1854.

NOTTEBOHM, nŏt′te-bōm, Gustav (1817–82). A German musician and writer, born at Lüdenscheid, Westphalia. After he had studied for a year in Berlin with Berger and Dehn, he went to Leipzig (1840), where he became the friend and pupil of Mendelssohn and Schumann. He then studied under Sechter in Vienna (1846) and afterward taught music himself in that city. He became famous through his editions of musical classics and his critical reviews of the lives and works of great composers, notably Beethoven. His publications include: *Ein Skizzenbuch von Beethoven* (1865); *Thematisches Verzeichnis der im Druck erschienenen Werke von Beethoven* (1868); *Beethoveniana* (1872–87); *Beethovens Studien* (1873); *Thematisches Verzeichnis der im Druck erschienenen Werke Franz Schuberts* (1874); *Mozartiana* (1880); *Ein Skizzenbuch von Beethoven aus dem Jahre 1803* (1880).

NOTTINGHAM, nŏt′tĭng-am. An inland county of England (Map: England, E 4). Area, 844 square miles. The eastern portion is comparatively level, the west undulating; in the south are the upland moors and pasture lands and in the west are remains of the royal forest of Sherwood. The soil is fairly productive; the agricultural industries include market gardening and hop raising. There are important manufactures of textiles, iron, and vehicles, and some coal mining. The principal river is the Trent, connected by two canals with the Witham. Pop., 1901, 514,459; 1911, 604,089. Capital, Nottingham. Consult *Victoria History of the County of Nottingham* (2 vols., London, 1906–10).

NOTTINGHAM. A county borough and a city, the county town of Nottinghamshire, England, on the Leen, at its junction with the Trent, 125 miles by rail north-northwest of London (Map: England, E 4). It is built principally on the slope and at the foot of a rocky eminence crowned by an ancient castle. The market place, 5½ acres in extent, is surrounded by fine buildings. The Exchange, the town and county halls, the house of correction, St. Mary's Church (in Perpendicular style), St. Peter's Church (mainly Perpendicular), the Roman Catholic cathedral of St. Barnabas, and the University College, with its fine buildings (1881), are edifices worthy of special mention. The free grammar school, founded in 1513, was after a period of disuse revived in 1807, and in 1868 was removed to fine new buildings, becoming known as the High School. There are numerous hospitals for the poor and infirm, a public park of 150 acres, a common, called Bulwell Forest, of 135 acres, and a fine arboretum of 17 acres. The municipality owns the water, gas, and electric-lighting plants, markets, free libraries, baths, cemeteries, parks, tramways, artisans' dwellings, hospitals, lunatic asylums, a large sewage farm, etc. It is the sole municipality in England that maintains a college. Connected with the college are well-equipped technical schools, including an agricultural department and a natural-history school. In 1874 the town acquired Nottingham Castle and installed art galleries and a museum. Nottingham is an important industrial centre, the principal manufactures being bobbinet and lace and cotton and silk hosiery. Cotton, silk, and flax mills, iron, wire, bicycle, basket, brass, and bleaching works are in operation. Formerly the city was noted for its manufactures of woolens.

As the Snottengaham (home of the caves) of the Saxons, the place first became important in the ninth century. It was one of the five Danish boroughs. Nottingham Castle was built by William the Conqueror and was the seat of parliaments and other important historical events. Charles I set up his standard at Nottingham, and the castle was held at times by both Royalists and Parliamentarians. It was dismantled by Cromwell in 1644, rebuilt after the Restoration, and suffered severe damage from fire during the Reform Bill riots of 1831. Nottingham has been a manufacturing town for over 600 years. Its oldest charter, dated 1155, confirmed privileges granted by former kings. Its latest royal charter (1897) conferred the rank and title of city under the designation of "City of Nottingham and the County of the same City," in commemoration of Victoria's diamond jubilee. Nottingham is the seat of a United States consul. It sends three members to Parliament. Pop., 1851, 57,400; 1891, 213,877; 1901, 239,743 (the increase in the decade being 12.1 per cent); 1911, 259,904 (8.4). The area of the city is 10,935 acres. Consult Thomas Bailey, *History of Nottinghamshire* (London, 1853–65), and James Granger, "Old Streets of Nottingham," in Thoroton Society, *Transactions*, vols. x–xiv (Nottingham, 1907–11).

NOTTINGHAM, Earl of. See Finch, Daniel.

NOTTINGHAM, Heneage Finch, first Earl of (in the Finch line) (1621–82). An English lawyer and statesman, the son of Sir Heneage Finch, Speaker in Charles I's first Parliament. He was born in Kent County, Dec. 23, 1621, was a student at Christ Church, Oxford, studied law at the Inner Temple, and was admitted to the bar in 1645. He sat in the Convention Parliament and in 1660 he was appointed Solicitor-General and created Baronet. In religious affairs he was a conservative, insisting on the maintenance of bishops as a part of the Church Establishment and opposing all toleration of Dissenters. In 1670 Finch became Attorney-General and from 1673 to 1676 he was Chamberlain of Chester. Having gradually become the spokesman of the court in the House of Commons, he was appointed (1673) Lord Keeper of the Seals and was raised to the peerage as Baron Finch of Daventry (1674). The same year he resigned as Lord Keeper of the Seals to become immediately Lord Chancellor, and as such presided over the many important political trials of the day. In 1681 he was created Earl of Nottingham.

NOTTINGHAM WHITE. See White Lead.

NOT′TOWAY. An Iroquoian tribe, formerly living upon the river of the same name in southeastern Virginia. In language and alliances they were closely connected with the Tuscarora of North Carolina. When the English first occupied Virginia the Nottoway seem to have been one of the strongest tribes in the region, but in the later colonization period they were already hastening to decay. In 1701 they occupied a palisaded village on the west bank of the river, where they still numbered about 500 souls in 1722. In 1785 they held a reservation of 27,000 acres, very little of which, however, was under cultivation. In 1825 there were still 47 persons bearing the name, although their blood was probably more negro than Indian.

NO′TUS (from Gk. *νότος*, south). The southwest wind, called by the Romans Auster (q.v.).

NOUGUÈS, no͞o′gȧ′, Jean (1876–). A French composer, born at Bordeaux. Without having pursued the study of music seriously or systematically, before his sixteenth year he wrote an opera which showed sufficient talent to induce his father to send him to Paris for serious study. He won his first success with the opera *Thamyris* (1904), which was followed by *La Mort de Tintagiles* (1905) and *Chiquito* (1909). In the same year was produced *Quo Vadis*, which immediately made him famous and began its career of triumph over all the operatic stages of the world. It was produced in New York, Philadelphia, and Chicago in 1911. Nouguès's other operas are *La Vendetta* (1911) and *L'Aiglon* and *La Danseuse de Pompei* (both in 1912).

NOUMÉA, no͞o-mā′ȧ. The capital of New Caledonia, situated near the south extremity of the island (Map: Australasia, J 5). Its good harbor enjoys steam communication with Sydney. There is a branch of the Banque de l'Indo-Chine. The population in 1912 was 8961, of whom 5207 were free.

NOUMENON, no͞o′mė-nŏn *or* nou′-. In Kantian philosophy a term used to denote an object of thought which is not also an object of intuition or perception, actual or possible. According to Kant, knowledge is possible only of objects of perception; it is the result of the coöperative functions of perception and conception. Perception without conception is blind; conception without perception is empty. Now, a noumenon is an object of conception without the collaboration of perception. Such a noumenon would be, e.g., a substantial soul as a thing in itself or matter as a thing in itself. In antithesis to noumenon stands phenomenon, i.e., what appears within experience. A phenomenon is thus something empirical and noumenon is metempirical. The phenomenal soul and phenomenal matter are knowable. The phenomenal soul is the continuity of the sensations of an inner sense (i.e., whatever appears in the time of experience); phenomenal matter is the permanent in the flux of the sensations that appear in space. The noumenal soul cannot be in time, else it would become phenomenal; the noumenal matter cannot appear in space for the same reason. The noumenon being thus an object of thought that cannot enter into experience, Kant in accordance with the principles of his theoretical philosophy maintains that any attempt to claim knowledge about noumenon is hopeless. The conception of noumenon has no epistemological value other than the negative one of making a boundary beyond which knowledge may not pass. For bibliography, see Kant.

NOUN (OF. *noun*, *non*, *nun*, Fr. *nom*, from Lat. *nōmen*, name; connected with Gk. *ὄνομα*, *onoma*, Ir. *ainm*, OPruss. *emnes*, OChurch Slav. *imen*, Goth. *namō*, OHG. *namo*, Ger. *Name*, AS. *nama*, Eng. *name;* and probably ultimately with Lat. **gnoscere*, *noscere*, Gk. *γιγνώσκειν*, *gignōskein*, Skt. *jñā*, AS. *cnāwan*, Eng. *know*). In grammar, a word denoting a thing. Of the eight so-called parts of speech (see Grammar) the noun is one of the four primitive ones, the other three being the interjection (q.v.), pronoun (q.v.), and verb (q.v.). The noun is sharply distinguished both from the verb and from the pronoun, not only by its function, but by its inflection (q.v.), although the pronoun and noun show frequent similarities, and in certain languages, as in Hottentot and in the Polynesian dialects, the noun and the verb coincide in form. Traces of these points of contact survive in Semitic and Indo-Germanic, especially in the verbal nouns, i.e., the infinitives, which are nouns in form and verbs in force. Moreover, in the Indo-Germanic languages there are many instances in which, on account of the similarity of function of nouns and pronouns, pronominal inflection has been extended by analogy (q.v.) to the nouns and nominal inflection to the pronouns. Nouns are inflected for gender (q.v.), number, and case. Conventionally they are divided into common, proper, abstract, and collective. Common nouns denote material, concrete things, as *table*, *cat;* proper nouns denote particular individuals and personifications, as *John*, *Liberty;* abstract nouns denote qualities, as *goodness*, *pleasure;* and collective nouns denote masses of units, as *army*, *bundle*. This classification is valuable in certain grammatical and logical analyses, but from a philological point of view it is worthless. It should also be noted that in many instances the adverb (q.v.), and by implication the preposition (q.v.) and conjunction (q.v.), were originally a stereotyped case form of a noun, as in the French adverbial suffix *-ment*, which is derived from the Latin *mente*, ablative of *mens*, mind, as *aimablement* (amiably) from Latin *amabili mente* (with lovable spirit).

Bibliography. Fr. Müller, *Grundriss der Sprachwissenschaft*, vol. i, part i (Vienna, 1876); Delbrück, *Vergleichende Syntax der indogermanischen Sprachen*, vol. i (ib., 1893); Zimmern, *Vergleichende Grammatik der semitischen Sprachen* (Berlin, 1898); Audouin, *Déclinaison dans les langues indo-européennes* (Paris, 1898); Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen*, vol. ii (2d ed., Strassburg, 1906), as well as his *Lehre von den Wortformen und ihrem Gebrauch* (Strassburg, 1913); Paul, *Prinzipien der Sprachgeschichte* (4th ed., Halle, 1909); Gauthiot, *La fin du mot en indo-européen* (Paris, 1913); Bloomfield, *Introduction to the Study of Language* (New York, 1914). The following works contain valuable psychological and other data: Ginneken, *Principes de linguistique psychologique* (Paris, 1907); Mauthner, *Beiträge zu einer Kritik der Sprache* (2d ed., 3 vols., Stuttgart, 1906–13), as well as the same author's *Die Sprache* (Frankfort, 1906).

NOURSE, Edward Everett (1863–). An American Congregational theologian, born at Bayfield, Wis. He studied at Lake Forest Academy and University in 1883–86 and at Macalester College, St. Paul, Minn., in 1886–87, graduated at Lake Forest in 1888 and at Hartford Theological Seminary in 1891, and attended the University of Jena in 1894–95. He was ordained to the Presbyterian ministry in 1893, served as pastor of the Second Congregational Church at Berlin, Conn., in 1895–98, and at Hartford Theological Seminary was instructor (1898–1900), associate professor (1900–05), and thereafter professor of biblical theology. After 1903 he added to his other duties that of lecturer on biblical literature at Mount Holyoke College. He contributed to the New International Encyclopædia and is author of *The Epistles of Paul* (1911), republished as *Selected Epistles of Paul* (1915).

NOUVELLE FRANCE, nōō′vĕl′ fräɴs′ (Fr., New France). The early name of Canada.

NOUVELLE HÉLOÏSE, ȧ′lō′ĕz′, La. See Julie.

NOUY, Jules Jean Antoine, Lecomte du. See Lecomte du Nouy, J. J. A.

NOVAC′ULITE (from Lat. *novacula*, razor, from *novare*, to renew, from *novus*, new; connected with Gk. *νέος*, *neos*, Skt. *nava*, OChurch Slav. *novŭ*, Ir., Gael. *nuadh*, Goth. *niujis*, OHG. *niwi*, *niuwi*, Ger. *neu*, AS. *nīwe*, *neowe*, Eng. *new*). The name given to a fine-grained rock composed of minute quartz particles—probably a consolidated siliceous ooze. A variety of novaculite called Arkansas stone, from its occurrence in Arkansas, is much used for whetstones.

NOVAIA PRAGA, nạ′vȧ-yȧ prä′gȧ. A town in the Government of Kherson, south Russia, situated about 200 miles north of Kherson. It carries on some trade in timber, and had a population of 11,141 in 1907.

NOVÁKOVIĆ, nô-vä′kô-vĭch, Stojan (1842–). A Servian statesman and philologist, born at Shabatz and educated at Belgrade. In 1865 he became teacher at the college of Belgrade and in 1869 chief librarian of the national library. At the college he was promoted to be professor of Servian philology in 1876. Between 1873 and 1883 he was three times Minister of Education, in which post he reorganized the system. Subsequently Novákonić held the portfolio of the Interior (1884–86), was Minister to Turkey (1886–92), Premier and Minister of Foreign Affairs (1895–96), again Minister to Turkey, and in 1900–05 Minister at St. Petersburg. A voluminous writer, he contributed to the reviews articles on Servian and Slavic literature, grammar, and history and published, among other works, *Istorija sprske knjizevnosti* (1867).

NOVALICHES, nō′vȧ-lē′chȧs, Manuel Pavía y Lacy, Marquis de (1814–96). A Spanish marshal. He was born at Granada, studied at the Jesuit school (Valencia) and the Royal Artillery Academy (Segovia), saw service in the first Carlist War, and became general of division in 1840. He became life Senator (1845) and Minister of War (1847) for the Moderates and was made Marquis in 1848. As captain general of the Philippine Islands (1852) he suppressed a rebellion and accomplished many reforms. Volunteering to quell the insurrection in Madrid (1866) and, upon the outbreak of the revolution (1868), taking command of Isabella's troops, he was wounded and disfigured for life. Novaliches remained an ardent supporter of Isabella.

NOVALIS, nô-vä′lĭs (Lat., fallow land). A name assumed by Friedrich von Hardenberg (1772–1801), a German author, a member of the early Romantic school, one of the most notable of mystic poets. He was born May 2, 1772, at Wiederstedt, in what is now Prussian Saxony. His parents had Moravian leanings, and this mystic religion permanently influenced him. He studied at Jena, Leipzig, and Wittenberg, and in 1794 went to Tennstädt to further his legal training. There he fell in love with a delicate 13-year-old girl, who died as his betrothed in 1797. He felt his loss deeply, but having gone to Freiberg to continue technical studies, became again betrothed. He returned to Weissenfels in 1799, but was obliged by serious lung trouble to postpone his marriage. Two years later he died (March 25, 1801). His writings were soon collected by the Schlegels and issued in two volumes, several times reedited, with a third volume in 1846. A handy edition of his works was edited by Boelsche (4 vols., Leipzig, 1908). The standard edition by Minor (Jena, 1907) has four volumes. His works are mainly fragmentary. Noteworthy among them is an unfinished romance, *Heinrich von Ofterdingen*, an apotheosis of the poet and poetry, in which occurs the symbol of Romanticism, the Blue Flower. Carlyle recommended its "perusal and reperusal." Difficult on account of its deep mysticism, it nevertheless contains charming passages and excellent poetry interspersed with narrative. In *Die Lehrlinge zu Sais* the Disciples discover that the secret of nature is nothing else than the fulfilled longing of a loving heart. The *Hymnen an die Nacht*, famous also in their way, give deep-felt expression to his bereavement. His fragments deal largely, in aphoristic form and in the spirit of philosophical mysticism, with the problems of life and science. His religious lyrics have an emotional tenderness and a nebulous charm.

The rest of his work is all but forgotten. Consult: Haym, *Friedrich von Hardenberg* (2d ed., Gotha, 1883); id., *Die romantische Schule* (Berlin, 1870); Ernst Heilborn, *Novalis der Romantiker* (Berlin, 1901); Thomas Carlyle, "Novalis," in *Critical and Miscellaneous Essays* (Edinburgh ed., New York, 1903); Ricarda Huch, *Die Romantik* (4th ed., Leipzig, 1911); Maurice Maeterlinck, "Novalis," in *On Emerson and Other Essays* (New York, 1912).

NOVARA, nō-vä′rȧ. The capital of the Province of Novara, Italy, a railway centre, 30 miles west of Milan (Map: Italy, B 2). It commands fine Alpine views from the boulevards on the site of its dismantled fortifications, and has several notable churches, chief of which is the cathedral, dating partly from the fourth century. It was rebuilt between 1860 and 1870, and contains fine frescoes and sculptures and a grand high altar. The church of San Gaudenzio is notable for paintings by Gaudenzio Ferrara and for its dome, 396 feet high. The city has a lyceum, museum, bishop's seminary with a library of 30,000 volumes, a technical school, a trade school, and a school of art. It is the seat of a bishop. The principal industries are the spinning of silk, cotton, and linen cloths, weaving, dyeing, and the manufacture of iron and organs. The town is the centre of a fertile district, producing grapes, rice, and corn. Pop. (commune), 1901, 45,248; 1911, 54,571. Novara is the ancient Novaria. The town passed successively into the possession of Milan, Spain, Austria, France, and Sardinia. It was the scene of a battle, March 23, 1849, between the Sardinians and the Austrians, which resulted in the complete defeat of the Sardinians and led to the abdication of Charles Albert in favor of his son, Victor Emmanuel.

NOVA SCOTIA, nō′vȧ skō′shȧ. A province of the Dominion of Canada, bounded on the northwest by New Brunswick and the Bay of Fundy, on the north by the Strait of Northumberland (separating it from Prince Edward Island) and the Gulf of St. Lawrence, and on the other sides by the Atlantic Ocean (Map: Canada, S 8). It consists of two portions, Nova Scotia proper (a large peninsula connected with New Brunswick by an isthmus about 15 miles in width) and the island of Cape Breton (q.v.). The peninsula, about 280 miles in length and from 50 to 100 miles broad, extends in a northeast and southwest direction. Cape Breton lies northeast of Nova Scotia proper, and is separated from it by a narrow strait called the Gut of Canso, 16 miles long and from ½ mile to 2 miles wide. Sable Island (q.v.) is a dependency of the province. The area of the province is 21,428 square miles, of which 360 are under water.

Topography. The surface of Nova Scotia is undulating and traversed by broken ranges of hills, whose direction is in general that of the long axis of the province. The direction of these uplifts, together with their rock formation, identifies the region as a part of the older Appalachian system. The highlands of the province may roughly be grouped into three sections: first, those running along the Atlantic coast, constituting the backbone of the peninsula and forming a wide plateau narrowing to the northeast, where they represent the projection of Cape Canso; second, the Cobequid Hills, which form the isthmian projection into the Bay of Fundy and run thence southeast until, in the eastern end of the peninsula, they meet the first-named range; third, a very narrow and detached range of trap rock on the coast of the Bay of Fundy, separated from the main plateau by St. Mary's Bay and the valley of the Annapolis River.

The great plateau of the peninsula seems to have been originally a vast upheaval of Devonian age, probably as high as 10,000 feet. This has been denuded by the action of wind and water to its present condition of a peneplain of about 400 feet in the south, rising to nearly 1000 feet in Cape Breton. Some residual hills of hard rock have been left, and in many places the igneous granite core of the former mountain has been laid bare. The remaining rocks covering the core on either side belong chiefly to the Cambrian system, especially along the east coast. There are some outcroppings of the Algonkian group, and along the north and west edge of the plateau there are remnants of highly fossiliferous Devonian and Upper Silurian strata. The Triassic lowlands to the north and west of the plateau around the Basin of Minas were probably formed by submarine denudation. They are underlain by very thick strata of Carboniferous rock. The Cobequid plateau, which rises from the midst of these lowlands, has been shown to be of late Devonian origin.

The greater portion of the province drains to the southward, through numerous short rivers. Small lakes are also numerous, Lake Rossignol in the south being the largest on the peninsula. The large body of water in Cape Breton Island, called Bras d'Or Lake, which almost divides the island, is an inland sea.

Climate. The insular position of Nova Scotia renders its climate different from that of the other Canadian provinces. For instance, it is not subject to great extremes of heat and cold, but has, on the other hand, a larger amount of cloudy and foggy weather. The southwest and west winds blowing from the water and protection from the north and northwest winds tend to modify the rigors of winter. The northern hills are especially useful in warding off the north winds, and the range which borders the Bay of Fundy protects the Annapolis valley from the winds and fogs which are common to the bay region. The temperature seldom falls below zero, and the summer maximum in the region of Halifax (lat. 44° 38′ N.) is about 68° F., being somewhat higher than this in the interior. The annual precipitation averages about 45 inches.

Minerals. The province is rich in mineral resources and mining is a growing industry. The Carboniferous rocks of northern Nova Scotia and Cape Breton Island contain coal seams of great thickness, the coal being a superior quality of the bituminous variety and well adapted for coking. In 1913 the production amounted to 7,972,727 tons. This slightly exceeds the combined production for all the rest of Canada and constitutes the main source of supply for the Maritime Provinces. Gold is found in the quartzites and slates of the Cambrian age that parallel the Atlantic coast of the peninsula. The vein ores (they have been worked since 1860) were formerly very rich, but have now become nearly exhausted. The product in 1913 amounted in value to only $44,916. Rich deposits of iron ore are found. In 1913 there were 480,068 tons mined, with a value of $7,201,020. Small quantities of gypsum and manganese are mined in Cape Breton Island, and antimony is exported from the region north of Halifax.

Fisheries. Fishing is one of the leading industries. The province surpasses all other provinces, except British Columbia, and all the states of the continent in the annual value of its fish output. For a long period the value of this output has run from $6,000,000 to $8,000,000, and in 1913 it amounted to $7,384,055, slightly more than half the value of the British Columbia fisheries. The catch includes deep-sea, inshore, and river varieties. The first two, however, are most important. Sea fishing is encouraged by a bounty offered since 1882 by the Dominion government. About two-thirds of it —$100,000—have gone annually to the 14,000 or more Nova Scotia fishermen. The cod and lobster fisheries surpass others in importance, the annual product being over $2,000,000 for each. Nova Scotia has 12 of the 51 fish hatcheries of Canada.

Agriculture and Game. The valley lands of Nova Scotia are exceedingly fertile. Even the careless method of cultivation too frequently indulged in has failed to exhaust this fertility. The hill lands are more rocky and less fruitful. The flora is much the same as is found in other sections of Canada south of the St. Lawrence. As a result of its somewhat insular climate, however, a few species are found which are unknown in other parts of the continent. Forests originally covered the greater portion of the province, the varieties of trees being well divided between the hard and soft woods, the former being more common in the protected valleys. At many points the original forests have been removed, with the result of a noteworthy climatic change—noteworthy because different from that which usually follows forest removals —viz., the moist coast air gains a more easy access to the interior, increasing the degree of moisture of both atmosphere and soil. Tamarack, spruce, balsam, and other soft woods have taken the place of the beech, maple, elm, walnut, and other hard woods, where these have been removed. Furthermore, extra drainage is required and the agricultural industry has been materially modified. There is an excellent agricultural college at Truro.

The per-acre yield of almost every crop raised is scarcely exceeded in any part of the continent. The cultivation of the soil, however, is confined to the valleys and has not more than held its own for a long time. Hay, potatoes, oats, and turnips are the most favored crops; wheat, buckwheat, and barley are next in importance. In 1913, 531,000 acres planted with hay and clover seed yielded 876,000 tons, valued at $10,135,000; 32,000 acres of potatoes, 5,369,000 bushels, value $2,792,000; 101,500 acres of oats, 3,291,000 bushels, value $1,747,000; 12,000 acres of turnips, 4,681,000 bushels, value $1,685,000. The wheat, buckwheat, and barley production for 1913 were valued respectively at $304,000, $183,000, and $101,000. There were, in 1913, 31 flour mills in the province, with a capacity of 800 barrels a day. The root crops—especially potatoes and turnips—receive much attention. The greatest agricultural activity centres in the protected Annapolis and Cornwallis valleys, which have become renowned for their production of fine fruits. Fruit raising is receiving increased attention and apples constitute one of the principal articles of export, their reputation having been won both by virtue of their flavor and their keeping qualities. The apple belt of the Annapolis valley region, which is only slightly developed, is estimated to have a capacity of 40,000,000 barrels, about equal to the apple crop of the United States. The apple crop in 1913 was valued at nearly $2,000,000. The export trade has developed from 20,000 barrels in 1880 to 1,750,000 barrels in 1911. There are 35 model orchards established by the government. The broken land is well adapted to grazing and the usual varieties of domestic animals are bred. Cattle, however, is the only species which has received much attention. In 1913 there were in the province 62,550 horses, 130,468 milch cows, 153,726 other cattle, 217,734 sheep, and 56,580 swine. The value of the live stock in 1913 was $15,734,102. The dairy industry is only moderately developed. There were 16 butter and cheese factories in 1910, with a product of 264,243 pounds of cheese and 354,785 pounds of butter.

In many districts birds and wild animals—bears, foxes, wolves, deer, and smaller varieties —are in sufficient numbers to afford excellent hunting. Fox farming was active in 1913. See FUR FARMING.

Transportation. The maritime situation of Nova Scotia is most favorable for purposes of trade with European and Atlantic seaboard States. The coast line (about 1000 miles long) has an unusual number of indentations, which offer exceptional harbor facilities. The harbors on the Atlantic and the Bay of Fundy coasts are accessible the year round. Halifax (q.v.), on the Atlantic coast, is the harbor most frequented. Shipbuilding has greatly declined and in 1913 there were engaged in it only 20 establishments, with an invested capital of $1,574,035 and a product valued at $441,025. In 1912 Nova Scotia had 2158 vessels, of which about 200 were steamers. The total number had 143,295 net tons register. The Intercolonial Railroad, with terminals in Halifax on the east and in Sydney on the north coast, connects Nova Scotia with the other Canadian provinces. The Halifax and Southwestern and other lines traverse the southern part of the peninsula, making a total of 1360 miles for the province in 1913. As in the other provinces, government subsidies have greatly aided in railroad construction.

Commerce. The largest items of export are fish, coal, lumber, and minerals, while the imports consist largely of West India produce and British and American manufactured products. The total exports of the province for the fiscal year ended March 31, 1913, were valued at $24,201,473; the total imports were valued at $20,753,369.

Manufactures. No industry of the province has so bright a prospect as manufacturing. Nova Scotia has the exceptional advantage at home of the iron ore, coal, and limestone (used as flux), and therefore has become a seat of iron and steel manufacturing industries. Coke is being manufactured, and at Sydney in Cape Breton the iron and steel industry is being developed on an extensive scale. In 1913 there were at Sydney, New Glasgow, and Londonderry eight iron blast furnaces with a daily capacity of 1980 tons. The forests afford a large supply of tanning barks. This has given rise to the tanning industry. Another natural advantage to manufacturing is the great water power afforded by the streams of the province. There are a number of cotton mills. Sugar is manufactured at Halifax. Extensive fruit raising explains the number of canning factories. Butter and cheese factories are but slowly increasing in number, the dairy industry having relatively declined. In 1910 there were in the province 1480 manufacturing establishments, with an invested capital of $79,596,341, 28,795 employees, with salaries and wages amounting to $10,628,955 and an output valued at $52,706,184. In 1905 there were 909 establishments, 24,237 employees, salaries and wages amounting to $9,284,864, and an output valued at $32,574,323.

Banks. In 1913 the chartered bank branches numbered 104. The clearing-house transactions in Halifax in 1913 amounted to $105,347,636.

Government. Nova Scotia was incorporated with the Dominion of Canada in 1867 and is represented in the Canadian Parliament by 10 Senators and 16 members of the House of Commons. It has also its own local Legislature and a Lieutenant Governor, who is appointed by the Governor-General of the Dominion in Council. The Legislature consists of a Legislative Council of 18 members, appointed for life by the Lieutenant Governor in Council, and a House of Assembly of 38 members elected by the counties—which are 18 in number—and by the cities, the municipal units of government being counties and towns. The people triennially elect county councils—each polling district having one representative—which in turn appoint the other county officers. It is necessary to secure the sanction of the people in order to borrow money, and the Lieutenant Governor in Council of the province has a right of veto upon the money-borrowing powers, as well as the by-laws passed by the county council. The capital of the province is Halifax.

The principal sources of revenue for the provincial government consist of the Dominion subsidy of about $635,000 annually and the mine royalties of about $850,000. The total receipts for the year ended Sept. 30, 1913, were $1,920,565, and the expenditures were $1,949,784, being $3.91 per head. The principal items of expenditure were: education, $340,696; debenture interest, $304,052; roads, $262,302; and public charities, $241,805. In 1912 the net debt of the province amounted to $10,894,652; but there were realizable assets of about $11,250,000.

The charitable institutions in 1913 consisted of a deaf and dumb institution, a blind institution, two general hospitals, a provincial sanatorium, county hospitals, and asylums for the insane. Persons sentenced for crime are sent to the Dominion penitentiary, maintained for the Maritime Provinces at Dorchester, N. B.

Public Utilities Commission. In 1909 a law was passed creating a board of commissioners, consisting of three members, for the supervision and regulation of public utilities. Persons or corporations furnishing heat, light, water, or power were made subject to the board in respect to regulation of rates and schedules and the prevention of discriminations. Annual returns are to be made to the commission, and from its decisions there is an appeal to the Lieutenant Governor in Council.

Population. The returns of the population for 1891, 1901, and 1911 were respectively 450,396, 459,574, and 492,338. Nearly all of the inhabitants are of British origin, the Scotch being in the majority. There is not so much unoccupied territory as in the other provinces (excepting Prince Edward Island), and the density of population—22.29 per square mile—is accordingly greater. Halifax, the seventh largest city of the Dominion, had a population of 46,619 in 1911. Sydney in Cape Breton Island had a population of 17,723 in 1911. Other towns and their populations in 1911 were Amherst (8973), Sydney Mines (7470), Yarmouth (6600), New Glasgow (6383), Truro (6107), Spring Hill (5713), North Sydney (5418), and Dartmouth (5058).

Religion and Education. The Roman Catholic church is numerically the strongest. According to the census for 1911 it contained 144,991 members, the other large religious bodies being the Presbyterians (109,560), Baptists (83,854), Anglicans (Episcopalians) (75,835), Methodists (57,606), and Lutherans (7359). The great interest in education is shown by the fact that 1 out of every 4.7 of the population attends school. The schools are free and undenominational; there are no separate Roman Catholic or Protestant schools as in Ontario and Quebec. The members of the Executive Council, or provincial cabinet, constitute the Council of Public Instruction, which, together with the Superintendent of Education, is at the head of the school system. Technical education has been greatly promoted and the Nova Scotia Institute of Technology has branches in all the industrial centres of the province. The schools are carefully superintended and gradation and uniformity of methods are generally maintained. In 1913 there were 2692 schools in operation, with 2861 teachers and 105,269 pupils. The value of the school property was $3,136,789. There were 59,862 pupils in graded schools and 45,407 in ungraded schools. There is one academy in each county. The province maintains the Provincial Normal College at Truro, but no university. The total cost of the school system in 1913 was $1,439,742. More than two-fifths of this is borne by government grants and municipal aid, the rest by local taxation. The following are the leading educational institutions: Acadia University, at Wolfville (Baptist); King's College (Anglican, or Episcopalian), at Windsor, the oldest chartered university in Canada; Provincial Normal College, Truro; University of St. François Xavier College, at Antigonish; and Dalhousie University, the Nova Scotia Institute of Technology, the Presbyterian College, and the Halifax Ladies' College and Conservatory of Music at Halifax. See CANADA, *Higher Education*.

History. Nova Scotia is believed to have been first discovered in 1497 by John Cabot, who sailed under the English flag. It is probable that the Portuguese navigator Cortereal explored the coast in 1500. The first settlers, however, were the French, who took possession of the country in virtue of the explorations of Verrazano, Cartier, the Marquis de la Roche, and Champlain. French fishermen frequented this locality, and in 1598 Henry IV of France granted Acadia, as the country was called, to De la Roche. In 1604 the first settlement was made by the Sieur de Monts, Samuel de Champlain, and the Baron de Poutrincourt on the island of St. Croix. This was removed in the following year to Port Royal (Annapolis). Throughout the French tenure the colonists of New England made attempts to obtain possession of the country, and in 1621 Sir William Alexander (q.v.) obtained from James I of England a grant of Acadia, which was now named Nova Scotia. In 1710 the English captured Port Royal, and in 1713, by the Treaty of Utrecht, France gave up its claim to the country, except to Cape Breton, or Isle Royale, which was ceded in 1763. In order to destroy the French influence, which continued to predominate, the English government in 1755 deported a large number of the French Acadians, estimated at more than 6000 (probably about half of the total population of French descent), and scattered them among English colonists from Massachusetts to Georgia. This act forms the theme of Longfellow's *Evangeline*. A blow was also struck at the French influence by the founding in 1749 of Halifax, which became a distinctly English centre. The development of the country was greatly aided by the arrival of Scottish settlers and by the large number of Loyalists (q.v.) who left the United States at the time of the Revolution. Until 1758 the control of the colony was almost completely in the hands of the Governor appointed by the King, but in that year the first Legislature was created. The country increased in population to such an extent that in 1784 the Province of New Brunswick was formed from a part of its territory. Cape Breton was also made a separate colony, but again became part of Nova Scotia in 1820.

During the War of 1812–14 Halifax was the most important naval station in America. Between 1782 and 1830 there was a large Scottish and Irish immigration to Nova Scotia, and after the War of 1812–14 the struggle for responsible government was the main feature of political life until 1848, when success was attained under the leadership of Joseph Howe. A free public-school system was established in 1864. Nova Scotia was at first opposed to Confederation, unwillingly joined it in 1867, and for several years thereafter a majority of the people supported a policy of repeal, but opposition gradually declined. Since 1884 the province has been under the political guidance of Liberal administrations. William Stevens Fielding (q.v.) was Premier in 1884–96, and since the latter year George Henry Murray (q.v.) has been Premier. The broad outlines of the policy of the two statesmen were practically the same. The development of the mining, fishing, and agricultural industries and of the railway system was the object aimed at by both, and latterly the educational interests of the province and the question of prohibition have absorbed much attention. An agricultural college at Truro, the establishment of government experimental farms and a school of horticulture, and the increase of agricultural societies have greatly benefited the farming interests. A technical college (1907) at Halifax was an important addition to the higher educational equipment of the province. The building of bridges and highways was greatly encouraged by the government and larger subsidies were obtained from the Dominion. In 1904 a splendid monument was erected at Halifax in memory of Joseph Howe (q.v.). In 1908 the one hundred and fiftieth anniversary of the founding of representative government in Nova Scotia (1758) was celebrated and a memorial tower at Halifax was afterward built. In 1910 a prohibitory liquor law was passed for all Nova Scotia except Halifax, forbidding the sale of intoxicating beverages except for medicinal, sacramental, and manufacturing purposes. Complaints were made in 1913 that the law had failed in part through lack of strict enforcement.

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NOVATI, nō-vä'tē, FRANCESCO (1859–). An Italian philologist and literary historian, born in Cremona. He became professor at Milan (1883), Palermo (1886), Genoa (1889), and Milan (1892); founded (with Arturo Graf and Rodolfo Renier) the *Giornale storico della letteratura italiana* (1883); and was author and editor of many articles and volumes on the Middle Ages and Renaissance in Italy. A number of his critical essays are collected in *Studi critici e letterari* (1889). Later works are: *L'influsso del pensiero latino sopra la civiltà italiana del medio evo* (1897); *Attraverso il medio evo* (1905); *A ricolta* (1907); *Freschi e minii del dugento* (1908); *Storia letteraria d'Italia: le origini* (1900–09).

NOVATIAN. A Roman presbyter of the third century, noted chiefly for the schism to which he gave his name. According to a late account, he was born in Phrygia, but it is more probable that he was a native of the West. He was converted in mature life, during an illness, and received only clinical baptism (an incomplete form of the rite, sometimes administered to the sick), which was afterward charged against him as a canonical defect, yet did not hinder his ordination to the priesthood. During the vacancy in the Roman see caused by the Decian persecution (250–251), when the presbyters directed the affairs of the Church, Novatian quickly assumed the leadership among them. It was he who wrote two of the letters addressed by the Roman clergy to Cyprian. In the discussion about the lapsed (i.e., apostates in the persecution) Novatian insisted upon excluding them from fellowship, in opposition to the milder discipline advocated by the newly elected Bishop, Cornelius. Many of the clergy sympathizing with Novatian, he was put forward as rival bishop, whereupon he was pronounced schismatic by a Roman synod and excommunicated (251). Of Novatian's end little is known. A late account (by Socrates, fifth century) says that he died a martyr in the reign of Valerian (254–c.260). The Novatianists, or Cathari, as they were called (i.e., the pure), displayed an increasing strength, and churches of their order sprang up all the way from Spain to Asia Minor. In Africa they were especially strong. They flourished for a long time, and traces of them are found as late as the seventh century.

The difference between Novatianists and Catholics related to the theory of the Church. Both parties agreed that the Church was holy, as asserted in the creed, but the Novatianists interpreted this to mean a holy membership, and refused membership to the lapsed and later to all who had been guilty of mortal sins, even though penitent. The Catholics believed the Church was holy because of its sacraments, especially penance, by which holiness, if lost through sin, might be restored. The issue was similar to that raised by Montanus and Hippolytus (qq.v.), and it appeared again in the fourth century in the Donatist controversy. (See DONATISTS.) The Novatianists pushed their theory to its limit by insisting that even Catholics entering their communion should first be rebaptized.

Only two writings of Novatian survive—*On the Trinity* and the tract entitled *Jewish Meats*, relating to ceremonial questions. Some of the treatises formerly attributed to Cyprian are probably the work of Novatian, e.g., *Concerning Shows*, the *Value of Modesty*, and the *Praise of Martyrdom*. The anonymous treatise *Against Novatian* is held by Harnack to be from the Roman Bishop Sixtus II (257–58). Consult: Migne, *Patrologia Latina*, vol. iii (Paris, 1850); *The Ante-Nicene Fathers*, edited by Roberts and Donaldson, vol. v (New York, 1896); Adolf Harnack, *Geschichte der altchristlichen Litteratur bis Eusebius* (Leipzig, 1893); id., *History of Dogma*, vol. ii (Boston, 1899); E. W. Benson, *Cyprian: His Life, his Times* (London, 1897). The best edition of *De Trinitate* is by W. V. Fausset (Cambridge, 1909); of *De Cibis Judaicis*, Landgraf and Weyman, in *Archiv für lateinische Lexicographie und Grammatik* (Leipzig, 1898).

NOVA'TION (Lat. *novatio*, renewal, from *novare*, to renew). In law, the substitution of one legal obligation for another.

At common law, as under the Roman civil law, there are three important classes of novation: 1. Novation by substitution of debtors. By mutual agreement a substituted debtor may assume payment of a debtor's obligation upon agreement of the creditor or obligee to accept him as a debtor, and to discharge the original debtor or obligor.

2. Novation by substitution of creditors. By mutual agreement of all the parties a creditor may agree to discharge his debtor upon the debtor's agreement to accept a third party as a new creditor and to pay the debt to him.

3. A new debt or obligation may be substituted for the old by mutual agreement between the same debtor and creditor.

The first class is of the most frequent occurrence at common law, but as all novations are dependent upon the substitution of a new obligation for an old by mutual agreement between an obligor and obligee, or between an obligor and obligee and a third party, it is evident that there may be as many particular forms of novation as there may be combinations by agreement among the parties specified.

As the essential element of novation is the agreement or contract between the parties, it is necessary that the essential elements of a contract, including mutual assent, promise, and consideration, should all exist in order to establish the relationship. In general the promise of the obligee to release the first obligor is sufficient consideration for the promise of the new obligor, and vice versa, and as the promise of each party to the novation is given in exchange for the promise of each of the others, it is necessary that the several promises should be contemporaneous. In order that the promise to give up rights under the earlier obligation may be a sufficient consideration for the new obligation, it is essential that the earlier obligation should be valid. There can be no novation of a void obligation.

As the result of a novation is the extinction of the earlier obligation, it follows that all liens attaching to it are extinguished unless expressly preserved or continued by the new obligation.

Properly any new obligation which is created by the parties to an old obligation and operates merely to suspend the old obligation for a certain period, instead of extinguishing it, is not a novation, but a merger.

New collateral agreements entered into as security for a preëxisting obligation do not effect a novation, as the original obligation continues in full force and effect.

Upon analogous classes of contracts, see ACCORD AND SATISFACTION; MERGER; SECURITY. See also ASSIGNMENT.

In the case of novation by the substitution of debtors, the substance of the transaction is that the new debtor pays the obligation of the old debtor and is thus within the express language of the Statute of Frauds. As, however, the purpose of the Statute of Frauds was to require contracts which were in effect contracts of suretyship, or contracts in the nature of suretyship, to be in writing, the courts have uniformly held that contracts of novation are not within the statute and need not be committed to writing. See FRAUDS, STATUTE OF. Consult the authorities referred to under CONTRACT.

NO'VA ZEM'BLA (Russ. *Novaya Zemlya*). An arctic archipelago, separating Kara and Barents seas, extending in crescent form from long. 52° to 69° E. and from lat. 70° 30′ to 77° N. (Map: Asia, G 1). The name was first applied to the large southern island, area about 15,000 square miles, separated from the northern island, area about 20,000 square miles, by Matochkin (Matthew) Strait. The Waigat (or Kara) Strait, part of the northeast passage (q.v.), separates the archipelago from European Russia. The islands of Nova Zembla are rocky, infertile, fiord-indented, and parts of its many low mountains, 2000 to 4000 feet high, are glaciated. The flora consists of dwarfed vegetation—willows a foot high being exceptional. The climate is of an insular type, with summers comparatively cold for the latitude, followed by warm winters.

Nova Zembla is part of the Province of Archangel, Russia. Efforts to establish permanent settlements of Russians failed until recently. In 1877 attempts were renewed to assert Russian control, impaired by summer visitations of alien hunters. The Samoyedean hunters were induced to prolong their summer visits to permanent occupancy. Several villages have been established near hunting grounds on the southern island. The native community at Karmakuli, at the west entrance to Matochkin Strait, which occupied permanent buildings and had a church, still survives. Governor J. W. Sosnovski has recently examined the agricultural possibilities of Gooseland, where grass thrives, and investigated the mineral deposits—coal being in quantities, copper and gold to some extent. Consult: Engelhardt, *A Russian Province of the North* (London, 1899); also in Russian, Sosnovski, *Materials for a Study of Nova Zembla* (St. Petersburg, 1910), and Shidlofski, *Bibliography of Northern Literature, by Northern Russian Society of Archangel* (ib., 1910).

NOV'EL (OF. *novelle, nouvelle*, Fr. *nouvelle*, from Lat. *novella*, fem. of *novellus*, new, dim. of *novus*, new), THE. To designate modern prose fictions—exclusive of the short story—there are current two English terms—*romance* and *novel*. The term "romance" (from the Latin adverb *romanice*), originally employed in Italy, Spain, and France (in other words, in the Romanic lands) to distinguish the common speech, i.e., the *lingua romana*, from the Latin of the learned, came in time to denote a composition in the vernacular, and finally any verse tale of intrigue and adventure. The word "romance" was established in English usage by the time of Chaucer. At first the word "novel" was probably the name given to some new story. In the twelfth and thirteenth centuries it was common among the Provençal poets for a verse tale of intrigue realistic in treatment. It was popularized in Italy by Boccaccio as the title of a short narrative in prose. When these Italian tales came into English the word came with them. It first occurs (so far as has been discovered) in Painter's *Palace of Pleasure* (1566). In the hands of several English writers the Italian *novella* was by degrees expanded, until by the eighteenth century it filled a duodecimo volume. Then came Richardson and Fielding with their larger delineations of contemporary life, which with some hesitancy they and their public called novels. Somewhat after this fashion the word "novel" became in English the generic term for prose fiction. Up to March, 1766, the *Monthly Review* placed works of fiction under the head of Miscellaneous Publications. In that month it made the subdivision Novels. From the Renaissance down to the eighteenth century the word "romance" was not much used in English. Then it began to appear as the explanatory title of the wild Gothic stories of Ann Radcliffe and her school. Since that time it has denoted a novel which represents men and women in strange, improbable, or impossible situations, and often in time past and in lands remote. Owing to very different literary conditions on the Continent, romance (French and German, *roman;* Italian, *romanzo*) is there the generic term, and "novel" still means a short tale. As its name by chance signifies, the novel as an easily recognizable literary species is a new thing. It hardly has a date before Defoe. And yet, in its genesis, the novel is as old as either the epic or the drama. Common to all peoples is the beast tale, in which animals are made to speak and conduct themselves as men and women. Popular stories of this kind were taken up by scholars of a later period, trimmed, moralized, and preserved in writing. Fairy tales and anecdotes of everyday life undergo a similar process until transformed into the verse or the prose story possessing an art of its own. In Egypt story-telling belongs to the oldest times. Indeed, Egypt was the source of many a tale that long afterward charmed Europe. (See EGYPT, *Literature and Science.*) The Sanskrit collection of tales known as the *Panchatantra* or *The Fables of Bidpai* (composed about 300 A.D.), and the fables attributed to Æsop, likewise Eastern in origin, found their way into western Europe and, blending with native incidents, became the basis of many a mediæval fiction in verse and prose. Very interesting is the Oriental device for stringing together a long series of tales, as in the *Seven Wise Masters*, widely diffused in the Middle Ages, and the better known *Arabian Nights*. This manner was adopted by Boccaccio in the *Decameron* and by Chaucer in the *Canterbury Tales*.

In India the novel, in the technical sense of the word, began probably with the *Adventures of the Ten Princes* (*Daśakumāracarita*) by Dandin (q.v.) in the latter part of the sixth century A.D. This is a romance of roguery. In China the novel did not develop until the Mongol dynasty (c.1260–1368). The Chinese classify their novels under four heads—usurpation and plot, intrigue and love, superstition, and roguery. These romances abound in action, but characterization is less developed. The Ming dynasty, which followed the Mongol, produced many romances, most of which are by unknown authors. Fiction developed in Japan earlier than in China. The first novel of importance is the *Genji Monogatari*, a long romance of love, containing much valuable information regarding society about 1000 A.D. Before this there had been a number of *Monogatari*, or narratives, many of them novelistic in character, such as the *Taketori, Ise, Utsubo*, and *Yamato*. In the seventeenth century Japanese fiction revived after a long period of decline, and though pornographic in the writings of Saikaku, was purified in the romantic novels of Kioden, Bakin, and Tanehiko. The masterpiece of Kioden is the *Inadzuma Hioshi*, a romance of roguery. Greatest of all was Bakin, who achieved his best in his *Yumibaritsuki*, published in 1805, although his work is disfigured by extravagances and impossibilities—a statement which holds good of another work of his, perhaps the most famous of all Japanese novels, the *Hakkenden*, which recounts the adventures of eight heroes of semicanine birth, who typify the eight cardinal virtues.

The ancient Greeks had their popular tales, about which little is known. After the glory of their art had departed there arose in the first centuries of the Christian era a class of rhetoricians who composed long romances in prose. They belonged, not to Greece proper, but to Alexandria and the cities of Asia Minor. The basis of their romances is an erotic tale. According to the usual plot, boy and girl lovers are separated, and after countless perils on land and sea among pirates and thieves, they are finally united. There is no attempt at likeness to truth; all is governed by chance. Such are the loves of Theagenes and Chariclea, in the *Æthiopica* (?fifth century), written by a certain Heliodorus. The *Æthiopica* is one of a group of romances to which belong *The Incredible Things beyond Thule*, by Antonius Diogenes (second century), containing an account of a voyage to the north pole, travels in the sun and moon, and of a descent into Hades; the *Babylonica*, by Iamblichus the Syrian (second century); the *Ephesiaca*, containing the germ of the story of Romeo and Juliet, by Xenophon of Ephesus (?third century); *Apollonius of Tyre* (existing in a Latin version of the fifth century), the original of Shakespeare's *Pericles;* and *Clitophon and Leucippe,* by Achilles Tatius of Alexandria (fifth century), abounding in marvels and horrors duly explained, as in the romances of Ann Radcliffe. Standing by itself is the pastoral *Daphnis and Chloe* (?second century), of unknown authorship, sweet, decadent, and sensuous. The extravagances of Eastern Greek romance, which must have been similar to those of Antonius Diogenes, were satirized by Lucian (born c.120 A.D.) in his *True History.* Lucian takes his hero into the belly of a whale, on to the morning star, and to the Elysian fields. A more pronounced realistic aim is found in the *Golden Ass* of the African Apuleius (q.v.), written in Latin. Embedded in its sensuality is the beautiful fairy tale of *Cupid and Psyche.* Ancient realistic fiction threw off all restraint in the *Satiricon* of Petronius Arbiter, which describes the debauchery of Roman society under the first emperors. To sum up, antiquity gave to the new nations of western Europe a moralized prose tale, a romance constructed on the lines of the epic, an artificial pastoral, the burlesque, and the sketch of contemporary manners.

Through Arabic literature, as well as through other channels still obscure, Christian Europe became acquainted with Oriental fiction. The first finished Arabic stories were based on Persian models. Even during Mohammed's lifetime, Nadr ibn Harith recounted at Mecca tales told by Persian merchants. The native Arabic short story was not, however, altogether neglected, although the books of Al Jahiz (died 869), Abu Bekr ibn abi 'd-Dunya (died 894), and Muhsin al Tanukhi (died 997) are of little importance for the history of the novel. Arabic fiction culminated in the thirteenth century in the collection of *The Thousand Nights and One Night,* usually called the *Arabian Nights* (q.v.), and in the romance of *Antar* (q.v.).

Middle Ages in Europe. Among the new peoples after the fall of Rome, just as among the Greeks, narrative poems of a more or less epic cast flourished long before the romances. But by the end of the twelfth century the epic impulse which had created *Beowulf* and the *Chanson de Roland* had spent its force and the age of romance had begun. Around characters and events, historical in truth or believed to be historical, the trouvères were weaving strange, marvelous, and purely fanciful incidents. Inexhaustible themes they found in Charlemagne, Arthur, Alexander, and the siege of Troy. Out of "the Celtic matter" especially they created permanent character types—Arthur, Lancelot, Percival, Guinevere, and Iseult. These verse tales began to yield in the thirteenth century to the romances of adventure, which frequently laid little or no claim to historical truth. The choicest extant specimen of them is the "chantfable" *Aucassin et Nicolette,* in prose and assonanced verse, meant to be sung. By the side of romance were cultivated the *fabliaux* (q.v.), which depicted the intrigues and the humorous side of life. The leading types of mediæval fiction received their highest finish from the hand of Chaucer. The *Canterbury Tales* and *Troylus and Cryseyde* mark important steps from the romance to the novel. There were already signs of the age of prose, soon to demand a printing press. The Arthurian romances were turned into prose in the thirteenth century. The *Gesta Romanorum,* a Latin collection of stories, first got into print in 1472, but these stories are of a much earlier origin. By 1353 Boccaccio had published the *Decameron.* About two centuries later the *Decameron* furnished the plan of the *Heptameron* of Margaret of Navarre. Through the Greeks in southern Italy and the Crusaders Greek fiction reached western Europe in the twelfth century and earlier. The boy and girl separated by pirates or some chance, and brought together in a pretty recognition scene, became a common type in the romances of adventure. Eastern tales, coming likewise through Italy and also through the Moors in Spain, were mingled with native incident in the *Gesta Romanorum,* the French *fabliaux,* and the Italian *novelle,* and from these sources they spread still more widely.

Modern Times, from Caxton to Richardson in England. The invention of printing (fifteenth century) meant the end of the verse tale except as a survival. Of course, the transition from verse to prose was not sudden. A prose style suitable to orderly narrative had to be created, and the audience of the minstrel had to be taught to read. Both processes were slow. The first schoolmasters and the founders of English prose were Caxton and the learned printers who followed him. The first book printed in the English language was a collection of stories in which the divinities of ancient Greece are transformed into the lords and ladies of feudal society. It is known as the *Recuyell of the Histories of Troy,* and was printed by Caxton, probably in 1474, at the press of Mansion in Bruges. After Caxton had set up his own press in Westminster he issued many romances, which were commonly prose expansions of mediæval tales and legends. Most significant of all is the *Morte d'Arthur* (1485), compiled from various sources by Sir Thomas Malory in 1469–70. The result was not a well-constructed romance; the matter was too heterogeneous for that. But it was a fiction "pleasant to read" and "written for our doctrine." Of especial interest, too, are *Reynard the Fox* (1481), the *Four Sons of Aymon* (1489), and *Blanchardin and Eglantine* (1489). The great labors of Caxton in translating, editing, and printing were continued by his noble followers in the sixteenth century. Perhaps the finest work done by or for them was *Huon of Burdeux* (c.1534), a half fairy tale translated by Lord Berners out of the French. To this time belongs also the *Utopia* (1516), by Sir Thomas More. A full list of the romances issued by the English press before 1550 would be a revelation as to the spread of the taste for reading marvelous tales.

But the redactors employed by the printers in compiling bulky volumes lost sight of plot. The *Morte d'Arthur* is a series of adventures centring about various knights and ladies, and loosely connected with the career of King Arthur. Before there could be a novel, chaos had to be reduced to order. That service was performed after a fashion by Spain. *Amadis of Gaul* (q.v.), with its typical Greek story of the separation and the final union of the hero and heroine, thus becomes the first prose romance of chivalry. The pastoral, partly in verse and partly in prose, which had assumed a tenuous form in the Italian *Arcadia* (1504), by Jacopo Sannazaro, was developed by the Spaniard Montemayor in his *Diana* (1560). Still further, an unknown Spaniard transformed the tricks of mediæval tales into the short novel of manners. A merry scamp is put behind the scenes and permitted to relate what he sees there. The earliest of these so-called picaresque, or rogue, stories is *Lazarillo de Tormes* (1553). It was followed by a host of others, from which we rightly date the beginnings of the modern realistic novel. But the glory of Spain is *Don Quixote*. (See CERVANTES.) To outward appearances merely a burlesque of the romances of chivalry, it contains a careful delineation of manners and two character types—Don Quixote and Sancho Panza—who, as has been said again and again, are a summary of human nature.

To the Elizabethans everything of importance that had been done in fiction abroad was well known. And yet in this age of the drama there was no very marked advance in the art of fiction. Sidney's *Arcadia* (1590) is an attempt to unite the pastoral and the romance of chivalry and to give them the structure of the *Æthiopica* of Heliodorus. The pastoral as written by Greene, Lodge, and many others was the old romance of adventure reduced to prose and put in a new setting. What its possibilities were, had it been cultivated by a great literary artist, we may imagine from Shakespeare's *As You Like It*, founded on Lodge's *Rosalynde*. The most popular Elizabethan fiction was Lyly's *Euphues* (1579), a romance of high life. For the enchantments of the romance of chivalry Lyly substituted a wondrous natural history, which he derived from beast books or made up as he went along. As a realist great powers were displayed by Thomas Nash in his ill-constructed *Unfortunate Traveller*, or *Jack Wilton* (1594). Indeed, Nash anticipates the manner of Defoe.

Puritanism was a check to the imagination. From Elizabeth to the Restoration the only notable fiction is the *Argenis*, by John Barclay, composed in Latin (1621) and soon translated into French and English. Mainly a political romance framed to the Greek story of adventure, it is significant as an attempt also at history. It seems to be an important link between antiquity and the French *roman de longue haleine* cultivated by Gomberville, La Calprenède, and Mademoiselle Scudéry. Of this type the best examples are Scudéry's *Grand Cyrus* and *Clélie*, each in 10 octavo volumes. The extravagances of Scudéry were turned to finer issues by Madame de la Fayette in the *Princess de Clèves* (1678), often regarded, because of its sane analysis of passion, as the first French novel. To this period belongs also a famous pastoral, the *Astrée*, by Honoré d'Urfé (1610–27), which was burlesqued by Charles Sorel in the *Berger extravagant* (1627). There were, moreover, many realistic novels, as Sorel's *Francion* (1622), Scarron's *Roman comique* (1651–57), and Furetière's *Roman bourgeois* (1666). Akin to the Spanish picaresque novel, they all give a humorous description of middle and low-class life. For a further account of French and Spanish fiction the reader is referred to the articles FRENCH LITERATURE and SPANISH LITERATURE.

After the Restoration novel writing was resumed in England. French romance was imitated and a long series of low adventures was put together by Richard Head under the title *The English Rogue* (first part, 1665). Of more interest is *Oroonoko* (1696; written much earlier), by Mrs. Aphra Behn (q.v.). In this short novel, founded on real events, there is some attempt at local color. But of all writers of this time John Bunyan (q.v.) did most for fiction. Bunyan spoke from the heart. And, however impossible might be the tale he undertook to tell, he knew how to add the minute details that make fiction seem truth. Bunyan's successor was Daniel Defoe (q.v.). In narrative power Defoe was Homeric. His style is all movement; even description is turned into narrative. Because of its style, its interesting incidents so treated as to give the illusion of reality, and its ethical import, *Robinson Crusoe* (1719) is rightly regarded as the first worthy treatment of adventure. It has been asserted that Defoe was forestalled by Grimmelshausen's *Simplicissimus* (c.1669). This German story of adventure, however, belongs to the old order. In France Lesage had already published the first part of *Gil Blas* (1715), in which the picaresque novel was used as a vehicle of large satire on contemporary manners. Defoe took advantage of the immediate popularity of *Robinson Crusoe*. The succeeding novels possess all the qualities of the first except interesting subject matter. In *Gulliver's Travels* (1726) Swift at once gave the satirical romance its perfect finish.

Realists. After Defoe and Lesage, the novel was in danger of becoming plotless. It was Richardson who made the novel dramatic. *Pamela* (1740) is an expansion of the current bourgeois comedy such as Steele wrote. *Clarissa Harlowe* (1747–48) is an expansion of bourgeois tragedy such as Otway wrote. *Sir Charles Grandison* (1753) is likewise a comedy with its scene shifted to high life. Richardson's drama is not merely formal. He creates character types and he develops them in act and conversation before the mind's eye. Fielding, with his experience as a playwright, was able to improve upon Richardson's clumsy epistolary method. *Joseph Andrews* (1742) contains the matter of the comic romances, such as Cervantes and Scarron wrote, but is molded somewhat to the form of ancient comedy. His masterpiece, *Tom Jones* (1749), is a clever union of many types of comedy for many effects. *Amelia* (1751) is the pathetic drama of the family life then common in France and England. Fielding uses no letters (except for burlesque) or journals and memoirs. His characters speak directly, and the narrative, though hampered at times by episodes, is mostly in the third person. All the essentials of the novel were thus worked out by Richardson and Fielding. Since their time the advance in structure has been only in details. The novel left their hands a well-ordered literary species. They both aimed, each in his own way, to depict the inner and the outward life as it is. They were realists. True, a good deal that was traditional in fiction found its way into their work. The dastardly scenes in Richardson, which now so shock readers, were survivals from Greek romance. And Fielding appropriated the old picaresque escapades. Later realists, having mostly rid themselves of all this material, depend rather upon their own experience and observation. And though few novelists have dared discard love altogether as a motive, it is now treated less in its physical aspects. In spite of all this, which is indicative of the later development of fiction, probably no novel takes to itself more of human life than *Tom Jones*. No characters stand in clearer outline than its hero and Squire Western.

Richardson's work ended with *Sir Charles*

Grandison, and Fielding died in 1754. Tobias Smollett survived them. Much under the influence of the picaresque writers, he was careless in manner, and his imagination delighted in coarse and brutal scenes. He, however, created many caricature types at once professional and national—the Irishman, the Welshman, and the Scotchman. *Roderick Random* (1748) is the first novel of the sea from the pen of a seaman. *Humphrey Clinker* (1771) is, said Thackeray, "the most laughable story ever written." In distinction from the humorous Fielding, Smollett is comic. His formlessness and audacity became affectations with Laurence Sterne. *Tristram Shandy* (1759–67), beginning nowhere and ending nowhere, is hardly a novel, but it contains passages of the highest beauty, and a brotherhood of fools unequaled outside of Shakespeare. At this time Oliver Goldsmith wrote *The Vicar of Wakefield* (1766), the source of many idyls of village life.

The novel thus began at once to break up into several varieties. This process, owing to social conditions, went on apace. In the next generation there was a numerous class of writers who resorted to the novel for the purpose of popularizing theories of education and government. They were inspired by Rousseau and other French philosophers. Among them were Robert Bage, Charlotte Smith, Elizabeth Inchbald, Thomas Holcroft, and William Godwin. It may be claimed for them that they founded the didactic novel. Fielding had depicted his characters through *what* they said in dialogue. Except in the case of Squire Western, little stress was placed upon *how* they spoke. Here was another lesson to be learned from the drama or rather from the actor. And as soon as it was learned we had the novel of manners. Frances Burney was the pioneer with her *Evelina* (1778) and *Cecilia* (1782). In the Irish tales of Maria Edgeworth, as *Castle Rackrent* (1800) and *The Absentee* (1812), the interest centres generally and predominantly on the speech and behavior of the characters as social types formed by peculiar political and historical conditions. They are the first stories of provincial life in which a study of local manners, idiom, and dialect have a place of prime importance. The novel of manners reached its highest art in the work of Jane Austen, well represented by *Pride and Prejudice* (1813) and *Mansfield Park* (1814), admirable in structure, movement, and tone. Here first the drama and the epic became perfectly fused. The sentimental novel has perhaps had its greatest exponent in Goethe (q.v.), whose *Leiden des jungen Werther* (1773–74) set half of Europe to pondering over suicide and other morbid themes. *Wilhelm Meister* (1795, begun some 20 years earlier), on the other hand, is an autobiographic and to some extent a didactic novel. As regards the two works just named, and for further consideration of German fiction, see the article GERMAN LITERATURE, *passim*.

Romance and Sir Walter Scott. The old romances never became quite dead. As late as 1752 Charlotte Lennox thought it worth while to ridicule them in *The Female Quixote*. Under the impulse of the romantic spirit which was pervading all literature, a short ghostly romance was published by Horace Walpole in 1764. His *Castle of Otranto* set the standard for many writers, among whom were Clara Reeve, Ann Radcliffe, William Beckford, M. G. Lewis, C. B. Brown, William Godwin, and Mary Shelley. Perhaps the most typical specimen of their work is Mrs. Radcliffe's *Mysteries of Udolpho* (1794), which definitely marks an interest in scenery for its own sake. Godwin's *Caleb Williams* (1794) is the first detective story. These romances of the eighteenth century are forerunners of the tales of terror and wonder by Poe and Hawthorne. But Poe gave them a new art in *The Fall of the House of Usher* (1840) and *The Masque of the Red Death* (1842). To Hawthorne they suggested a dress for psychological problems. Walpole and his school commonly placed their scenes in mediæval times; hence their romances were known as Gothic, and they are, in a manner, historical in setting. It was a natural step for an innovator to make history the main interest. Such a step was taken by Sophia Lee, whose *Recess* (1785) is an historical fiction of the time of Queen Elizabeth. Her example was followed by many others, among whom were James White, W. H. Ireland, and, most noteworthy of all, Jane Porter, author of *The Scottish Chiefs* (1810). Nothing could be more preposterous than the way in which these writers dealt with history. Characters and incidents of different periods they introduced into the same scene. But they rarely employed the historical allegory; and they made possible *Waverley* (1814). To the amazement of his contemporaries, Scott poured forth during the next 16 years about 30 novels, covering English and Scottish history, with some gaps, from William Rufus to 1800. Among his English followers were Horace Smith, G. P. R. James, Harrison Ainsworth, and James Grant. He inspired Manzoni in Italy, Freytag in Germany, and Hugo and Dumas in France. His *Pirate* suggested to James Fenimore Cooper the brilliant tales of the sea beginning with *The Pilot* (1824); and for his Leather-Stocking Series, containing *The Last of the Mohicans*, *The Pathfinder*, and *The Deerslayer*, Cooper became known as the American Scott.

Return to the Novel of Contemporary Life. Scott's influence on the novel is not summed up by giving a list of his imitators or of those writers who discovered new romantic themes. He is in Thomas Hardy's woodland scenes as much as in Stevenson's *Master of Ballantrae*. He depicted the showy virtues, vices, and scenes in his outer plot, but beneath there was always careful observation of common life. Throw off the outer covering and you have the realistic novel. This was done by several writers, as Susan Ferrier, John Galt, and D. M. Moir, who wrote capital sketches of Scottish manners. Throw out the historical setting and you have once more the novel of contemporary manners. The transition is well marked by the work of Bulwer-Lytton. Likewise Charles Kingsley romanced the sea and ancient history (*Westward Ho!* and *Hypatia*) and dealt with the social conditions of his own time (*Yeast* and *Alton Locke*). But the immediate vogue of romance and history had already been checked. In France Balzac was insisting, in theory and in practice, that the novel should be a document based upon experience and observation. Balzac's vast *Comédie humaine*, aiming to represent every phase of French life, worked mightily in England, and gave fiction everywhere an encyclopædic character. In England the novel returned to the humors of society with *Pickwick* (1836–37). In this novel of great scope (for it contains more than 350 characters) appear the London cockneys. Having discovered London, Dickens went on to illustrate it in all its phases, and to include in his canvas much from the provinces, until he had created caricature types running into the thousands. Thackeray wrote *Vanity Fair* (1847–48). Instead of a Little Nell he took as heroine Becky Sharp and made her adventures the medium for depicting the ways of the upper and middle classes. This novel was followed by *Pendennis, The Newcomes, Henry Esmond, The Virginians,* and *The Adventures of Philip.* All possess exquisite humor and irony. In their somewhat loose structure they lean to the epic, but the method of procedure is dramatic. No other novelist has ever come near Thackeray in making his characters develop from page to page; witness both Becky Sharp and Rawdon Crawley.

At this time George Borrow was writing his eccentric gypsy novels, *Lavengro* (1851) and *Romany Rye* (1857), and Charles Reade was winning popularity. The way in which Reade and Dickens put together the novel of social satire was very displeasing to Anthony Trollope, who accused them of creating vices in the upper and middle classes merely to attack them. His ideal of a novel Trollope presented in the Chronicles of Barsetshire (1855–67), comprising *The Warden, Barchester Towers, Doctor Thorne, Framley Parsonage, The Small House at Allington,* and *The Last Chronicle of Barset.* In this imaginary shire he describes the clergy and their friends with a pleasing humor, running now and then into farce. Trollope brings his characters directly before the reader and lets them play out the drama. No one ever forgets characters like Septimus Harding, Mrs. Proudie, and Archdeacon Grantley.

Psychological Novel. Corresponding with the sequence of incident there is a sequence of thought and emotion. Lay the stress on incident and you have the romance or the novel of manners; lay it on the inner life and you have the psychological novel. Since Defoe the novel had to an extent swung between these two methods. But the psychological novel hardly became aware of itself before the middle of the nineteenth century. Hawthorne comes to the fore. Alike in his longer and shorter tales, as *The Scarlet Letter* (1850) and *The Great Stone Face,* he probes the conscience. Emily Brontë's *Wuthering Heights* (1848) is an intense lyric. Likewise in Charlotte Brontë's *Jane Eyre* (1847) and *Villette* (1853) what holds one spellbound is the spiritual life externalized in incident. Here, too, the work of Elizabeth Gaskell, best known as the author of *Cranford,* has significance. In her *Ruth* (1853) she employed for unifying the plot an ethical formula which may be styled the doctrine of the act and its consequences. But the memorable date in the history of the psychological novel is 1859. In that year appeared George Eliot's *Adam Bede* and George Meredith's *Ordeal of Richard Feverel.* In her first long story George Eliot kept in harmony the inner and the outer life, and each added to the interest of the other. Certainly after *The Mill on the Floss* (1860) incident was no longer able to sustain the philosophy. And yet *Romola* (1863) and *Middlemarch* (1871–72) are her most relentless studies in moral decay. All her novels are constructed on some variant of the doctrine of the deed and its consequences. George Meredith selects a small group of characters in a clearly defined situation—as in *The Egoist* (1879) and *Diana* (1885)—and then studies minutely their behavior. His view is less comprehensive than George Eliot's, but his analysis is more subtle.

At the opening of the twentieth century, for the time being, psychology seemed to have run its course in English fiction. True, some of the characteristics of Henry James connect him with Meredith; but James is master of several manners. The best contemporary work in psychology is represented by Paul Bourget, at the head of a French group. From the older psychology sprang the philosophic novel. The psychologists had their ethical formula, but it was not all-important. The philosophers thrust to the front determinism, an ethical theory whereby conduct is made to depend wholly upon heredity and environment, man being no longer considered a free moral agent. On this theory was planned the entire series of Emile Zola (q.v.), called *Les Rougon-Macquart* (1871–93). At this time Thomas Hardy stood for the very best type of the newer realism. The philosophical novel seemed a thing of the past, and its place was taken largely by the novel of a more distinct purpose, often called the problem novel, for it aimed at the solution of social problems. Such, e.g., is Hardy's *Jude the Obscure* (1895). This kind of novel is in part an inheritance from Dickens and in part a natural development from George Eliot. It discusses, by turn, creeds, heredity, class distinctions, agrarian conditions, labor and capital, municipal government, tenement-house reform, the enfranchisement of woman, the failure of marriage, the grounds for divorce, etc. The last three topics on the list have been favorites with many woman novelists. To this kind of fiction dignity was given by three writers, artists as well as thinkers, each belonging to a different country and each possessing his own methods—Tolstoy (q.v.) in Russia, Björnson (q.v.) in Scandinavia, and Mrs. Humphry Ward (q.v.) in England. Apropos of the first two of the authors just named, the reader is referred to the articles RUSSIAN LITERATURE and NORWEGIAN LITERATURE.

Other novelists, though possessed of ideas, have depicted contemporary manners with a less obvious purpose. Somewhat in line with Trollope were the many stories by Margaret Oliphant, as the *Chronicles of Carlingford,* including *The Rector and the Doctor's Family* and *Salem Chapel* (both 1863). Henry James and W. D. Howells, beginning as romancers, worked their way to a delicate realism—the first under the influence of Turgenev and Daudet, the latter under the influence of Tolstoy and of Spanish fiction as represented by Valdes and Galdós. James may fairly be said to have created the international novel. His field was successfully invaded now and then, as by Du Maurier in *Trilby* (1894). In his later work James studied the English drawing room. Howells confined himself to illustrating American types, as in *A Modern Instance* (1883) and *The Rise of Silas Lapham* (1885). From national types the novel both in England and in the United States ran into provincial types, and consequently into dialect. J. M. Barrie and John Watson spread knowledge of the Scottish parish. Jane Barlow described with much sympathy the Irish village. The tragic aspects of life in Devon, Somerset, and London were presented with much force respectively by Zack (Gwendoline Keats), Walter Raymond, and George Gissing; some phases of South Africa by Olive Schreiner, and both picturesquely and psychologically by Joseph Conrad; and of Australia by Tasma (Madame Couvreur) and Ada Cambridge. Likewise various sections of the United States have been treated by novelists. To New England belong Elizabeth Stuart Phelps Ward, Mary Wilkins, Sarah Orne Jewett, and many others; to the Mississippi valley, Mark Twain; to the West belong Bret Harte, Owen Wister, and Hamlin Garland; to the South, Mary Murfree, G. W. Cable, Hopkinson Smith, and T. N. Page. The society novel held its own: witness such clever examples of it as E. F. Benson's *Dodo* (1893) and Anthony Hope Hawkins's *Dolly Dialogues* (1894).

Of wider amplitude was the work of Rudyard Kipling, who made known an India that had escaped the observation of other Europeans. Manners and customs he described, and he sketched types of characters. But with him the energy went mainly to telling a good story, with its proper milieu and the incidents proper to it. That he restored to fiction interesting incident was one of his distinctions.

These and other realists greatly modified the outer form of the novel. Very generally the three-volume novel was cut down to one volume. This rendered necessary the excision of long descriptive passages and moral comments. The characters are now developed by what they do and say as much as by what somebody else says about them. Indeed, it was found possible to write a novel wholly in dialogue. The short story of a few pages also found its readers. To this literary form France and the United States for a period contributed most, though the short story is far older than Boccaccio. In France the cultivation of the short story is encouraged by the literary character of the press. In this genre there is nothing superior to the work of Daudet and Maupassant. The short story had another master in Gottfried Keller (q.v.), and found an expert also in Paul Heyse (q.v.). In the United States the short story, which has existed by right since Irving, Poe, and Hawthorne, was well adapted to the magazine. It assumed various forms under the hand of many writers, and has its vogue in England as well as in France and America. In the nineteenth century many short stories, and sometimes even the long novel, were devoted to the portrayal of animals other than man. By Joel Chandler Harris, in his stories of *Uncle Remus* (1880), animal life is treated fantastically, but with a never absent consciousness that the adventures of Brer Rabbit, Sis Cow, Mr. Wolf, and their fellows are fantastic. Thus, we get the humorous animal story based on folklore, as in the *Roman de Renard*. Kipling's *Jungle Books* (1894–95) gather Indian folklore about animals into short stories of great power. Herein the animals are again not wholly natural, but they act more naturally than in the stories of Uncle Remus. The tales of the Canadian C. G. D. Roberts range from the slightly fanciful to the wholly real. In *Bob, Son of Battle*, the Englishman Ollivant wrote an entertaining novel about the rivalry between two sheep dogs, Bob and Wullie. W. Fraser, who wrote *Mooswa of the Boundaries*, is esteemed highly by naturalists and lay readers for his imaginative yet truthful stories of wild life. Ernest Thompson-Seton's earlier work portrays the life and death of wild animals with some accuracy. His stories distinctly belong to fiction and not to artistic zoölogy.

Since Scott romance and adventure have never been absent from English fiction. Wilkie Collins became everywhere known by his *Woman in White* (1860), which was followed by many similar mystifications, as the *Moonstone* (1868). For the detective story he is the connecting link between Poe and Conan Doyle. In 1869 appeared *Lorna Doone*, the first of R. D. Blackmore's picturesque fictions, historical in setting and written in rhythmic prose. Then came the numerous romances of William Black, of which the type is *A Princess of Thule* (1874); the beautiful fancies of Richard Jefferies, as *Wood Magic* (1881) and *After London* (1885); and the tales of William Morris in verse and in prose. But the romancer of most pronounced influence on the English novel was Robert Louis Stevenson. In *Treasure Island* (1883) he gave style and a new form to the tale of adventure. In *Dr. Jekyll and Mr. Hyde* (1886) he fashioned the old story of wonder to an ethical purpose. In *Kidnapped* (1886) and *The Master of Ballantrae* (1889) he revived after his own way the historical romance. In *Prince Otto* he wove a dream into the semblance of history. And in *Ebb Tide* (1894) adventure was carried to the South Seas. From Stevenson there were several lines of development. Among those who followed him in history are Conan Doyle, S. R. Crockett, Stanley Weyman, S. Weir Mitchell, and Winston Churchill. In Great Britain and her colonies, as well as in the United States, historical fiction enjoyed great, though diminishing, popularity and often considerable intelligent esteem throughout the nineteenth century. In France historical fiction has been waning almost since the time when the elder Dumas announced that he had raised history to the dignity of fiction. Stevenson's fanciful history was transformed into delightful extravagance by Anthony Hope Hawkins in *The Prisoner of Zenda* (1894) and its sequel *Rupert of Hentzau* (1898). Further removed from Stevenson were certain extravagant fictions of H. G. Wells. Adventure wilder than Stevenson's was represented by Joseph Conrad and the Australasian novelists Louis Becke and Guy Boothby.

The fiction of the opening years of the twentieth century both in Europe and America was remarkable rather for its mass than for new and eminent names. It reached in all points of technique an average level of excellence well above that of earlier days. In England, apart from the work of certain older writers who continued active, the literary historian of the period will perhaps pause longest over the realistic novels of H. G. Wells, of Arnold Bennett, and of John Galsworthy; while in America such an historian should have before him the short stories of Sydney Porter (O. Henry) and the novels of Robert Herrick, Owen Wister, Gertrude Atherton, and Edith Wharton.

For further consideration of the novel, see the articles on American, English, French, Italian, and Russian literature; also the articles treating individually the authors mentioned in the foregoing sketch of the novel and in the studies of the literatures just named.

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NOVELDA, nô-vâl′dȧ. A town of southeast Spain, in the Province of Alicante, 15 miles west of Alicante, on the railway between that city and Madrid (Map: Spain, E 3). The town has oil mills and brandy distilleries, and there are sulphur springs in the neighborhood. Pop., 1900, 11,442; 1910, 12,045.

NOVELETTE, nŏv′el-ĕt′ (dim. of *novel*). 1. In music, a term invented by R. Schumann to characterize certain compositions (op. 21) in free form. A novelette is of some length and characterized by a great number of short themes introduced without regular succession. Schumann chose the name because in those works he made use of entirely novel effects both rhythmically and harmonically. 2. In literature, a term which began to be used towards the end of the nineteenth century to designate a short novel.

NOVELLA D'ANDREA. See Bologna, *History*.

NOVEL′LÆ (Lat., novels, nom. pl. fem. of *novellus*, new, dim. of *novus*, new). In Roman law, the ordinances issued by Justinian subsequently to the completion of the *Institutes*, *Pandects*, and *Codex*. They were written for the most part in Greek, although the Latin version alone has survived. No official compilation of them was made, but they were preserved in several private collections of varying comprehensiveness. One of these, the *Authenticum*, or *Liber Authenticorum*, was later regarded as the authoritative text, and in the twelfth century was incorporated, together with the other Justinian codes, in the *Corpus Juris Civilis*. Consult R. Sohm, *The Institutes*, translated from the German by J. C. Ledlie (2d ed., Oxford, 1901). See Civil Law; Justinian I; Pandects.

NOVELLI, nô-vâl′lê, Ermete (1851–). An Italian actor, born at Lucca, May 5, 1851. Both his father and mother were theatrical people but of no particular eminence. Novelli began his career in light comedy, in which he showed wonderful fertility of imagination both in extemporized and set rôles. He gained international renown through his interpretations of Shakespeare. In fact, his Othello, Hamlet, and Shylock rank high not only in comparison with those of Salvini but with those of the best English and American actors. In Italy he endeared himself to millions of people through graphic renderings of the most widely varying types, ranging from the frank buffoonery of the *commedia dell' arte* to the tragedy of contemporary life. His death scenes, such as that, e.g., of *Morte civile*, given with telling effect in New York in 1906, mark an epoch in Italian realistic acting. In 1900 Novelli founded his own theatre, the Casa di Goldoni, on the site of the Teatro della Valle in Rome. Consult Rasi, *Comici italiani* (Florence, 1905), which contains photographs of characteristic facial expressions, in which Novelli found one of his principal resources; also the humorous biography of "Jarra" (Florence, 1897).

NOVELLINO, nŏ′vĕl-lē′nô (It., the little novel), Il, or the Cento Novelle Antiche. The oldest collection of tales in Italian, belonging to the thirteenth century, and the beginning of a genre which manifested extraordinary fertility in Italy. The subject matter comprises traditions of all kinds, biblical, classical, and chivalrous, stories based on historical fact or wholly fictitious. The tales, gathered from various sources—from oral tradition, from the books of chivalry, from the French *fabliaux*, and from other earlier collections in Latin, the *Disciplina Clericalis* of Petrus Alfonsus and probably the *Gesta Romanorum*—seem to have been set down by a Florentine, for the language has no dialectical peculiarities. The prose is simple, the sentences short and clumsy; it has, however, a remarkable spontaneity. The tale here is a short and rapid sketch, of anecdotic character, given in a few rough strokes, with the interest centred on one point, frequently ending with a clever repartee and sometimes pointing a moral. The bare subject is intended to produce the entire effect, the tale not possessing an individual form until handled by Boccaccio. Consult the first edition of the *Novellino* by Gualteruzzi (Bologna, 1525; reprinted at Milan in 1825 by Michele Colombo), that by Carbone (Florence, 1868), and that by Donin (Turin, 3d ed., 1890); A. d'Ancona, "Del novellino e delle sue fonti," in the *Studi di critica e storia letteraria* (Bologna, 1880); Biagi, *Le novelle antiche* (Florence, 1880).

NOVEL'LO, Vincent (1781–1861). An English musician and editor, born in London, of an Italian father and English mother. At the age of 16 he was organist in the chapel of the Portuguese Embassy. He was one of the founders of the Philharmonic Society and of the great London music-publishing house, Novello & Co., established in 1811. His musical compositions, which are very numerous, and chiefly sacred, are considered to have contributed much to the improvement of cathedral music. As a painstaking editor of unpublished works of eminent musicians, he accomplished much for musical literature. He died in Nice, France.

NOVEMBER. See Month.

NOVERRE, nô'vâr', Jean Georges (1727–1810). A French dancer and reformer of the ballet, born at Saint-Germain-en-Laye. He was the son of Louis Noverre, adjutant of Charles XII of Sweden, was a pupil of the ballet master Dupré, and began as a dancer in the Royal Theatre. His ballets gave him such a reputation that Prince Henry of Prussia invited him in 1747 to Berlin, where he stayed a number of years. Subsequently he went to London, on the invitation of Garrick, as master of the ballet in the Drury Lane Theatre (1755–57), and still later he was equally successful at Lyons, Stuttgart, Vienna, Warsaw, and Milan. He was made ballet master at the Academy of Music in Paris in 1775, and there had the fullest opportunity to introduce those reforms which make him the real inventor of the modern ballet. His theory of the dance was that dress, music, and action must interpret one another. These ballets were often elaborated pantomimes of classical subjects treated in a serious manner. He also prepared the ballets in operas, notably that in Gluck's *Iphigenia in Aulis.* His *Lettres sur les arts imitateurs en général et sur la danse en particulier* (1807) remain the authority on his art.

NOVGOROD, nôv'gô-rôt. A government of Russia, bounded by the governments of Olonetz, Vologda, Yaroslav, Tver, Pskov, and St. Petersburg (Map: Russia, F 3). Area, about 45,770 square miles; pop., 1913, 1,653,400. The southern part belongs to the Valdai plateau and is mostly hilly. In the northeast are found a large number of lakes and immense impassable marshes—the beds of former lakes—covered with thin forests. The northwestern part slopes towards Lake Ladoga and is thickly wooded. The severe climate, marshy and stony soils, as well as the lack of adequate grazing grounds, render extensive agriculture unprofitable. The district is watered by numerous rivers, which connect it with the Baltic, the Caspian, and the White Sea. The chief of them are the Volkhov, the Sheksna and the Mologa, tributaries of the Volga, the Syas, flowing into Lake Ladoga, and the Msta, belonging to Lake Ilmen. Among the larger lakes may be mentioned the Byeloe and the Vozhe in the northeast. Many of the rivers are navigable and connected with each other and the lakes by an extensive system of canals.

The climate is severe, the yearly temperature at Novgorod averaging only 39° F. Farming is the leading industry, although its returns are so small as to oblige a large proportion of the population to engage in some other occupation, such as lumbering, or to emigrate for a part of the year to St. Petersburg. The house industry is only slightly developed, the chief item of production being nails of an inferior kind. Wood, live animals, and hay are the chief exports, and there is a considerable traffic on the rivers and canals. The population is composed chiefly of Russians belonging to the Greek church. There are also a number of Nonconformists. Novgorod is the seat of a Greek Catholic archbishop. For its history, see the article on Novgorod, the capital.

NOVGOROD, or Novgorod-Veliky, vĕ-lĕ'kê (Great Novgorod). One of the oldest and most celebrated cities of Russia, capital of the government of the same name, situated on both banks of the Volkhov, about 2 miles from Lake Ilmen and 120 miles south of St. Petersburg (Map: Russia, D 3). It is divided by the Volkhov into two parts, of which that on the left bank, with the kremlin, is known as the Sophieskaya (after St. Sophia), while that on the opposite bank is called the Torgovaya (meaning mercantile). The kremlin is surrounded by a stone wall dating from the fourteenth century and occupies a considerable area. Within the walls are situated the eleventh-century cathedral of St. Sophia, with a treasury of valuable relics, the twelfth-century church of St. Nicholas, and the Yaroslav Tower.

The churches of Novgorod are of the usual Russian style of architecture (see Moscow), having numerous round cupolas and dark and profusely embellished interiors. In 1862 a fine, massive monument was erected at Novgorod to commemorate the one thousandth anniversary of the foundation of the Russian monarchy. There are two Gymnasia, a theological seminary, a Realschule, and two museums of antiquities. There is some manufacturing of paper, flour, glass, trimmed lumber, etc., and agricultural products are exported to St. Petersburg. Pop., 1910, 27,130.

History. The origin of Novgorod is usually connected with the story of the first appearance of the Varangians in Russia, and the town is supposed to have been the residence of Rurik (862) (q.v.) and his successor Oleg. With the rise of Kiev (q.v.) Novgorod became to some extent its dependency, and these relations continued until the eleventh century. Then Novgorod was completely independent, electing its own princes. In the zenith of its prosperity the dominions of Novgorod the Great comprised the northern part of the present Russia above lat. 57° N., excluding Finland and the Baltic region. In its political institutions Novgorod presented a striking contrast to the other principalities of Russia. Without an hereditary line of princes, and geographically isolated from the rest of the country, it was guided in the selection of its rulers chiefly by its economic interests. The supreme authority was the vietché, or popular assembly, which was participated in by all freemen. This assembly elected the prince and the posadnik (mayor), as well as the commander of the army. At the height of its prosperity the city contained probably 100,000 inhabitants, some authorities placing the number as high as 400,000. Commerce was the chief occupation and was carried on by corporations so as to embrace a very large part of the population. Novgorod joined the Hanseatic League about the middle of the fourteenth century. It contained many foreign merchants, or guests, to whom were accorded special privileges. Hungarian and English coins circulated freely.

In the middle of the thirteenth century, Novgorod was under the rule of the national hero Alexander Nevski (q.v.). It held out the longest of Russian states against the tide of Mongol conquest, but was finally compelled to submit. With the rise of the principalities of Moscow and Lithuania, Novgorod became too weak to struggle against their encroachments, and was soon reduced to the necessity of paying tribute in order to retain its independence and republican institutions. In 1478 it succumbed to the arms of the Muscovite ruler, Ivan III, and was deprived of its liberties. Many of the prominent families were transferred to Moscow and replaced by families from the capital. The inhabitants having excited the wrath of Czar Ivan the Terrible, that monarch in 1570 put thousands to the sword. This completed the downfall of Novgorod. Consult V. O. Kluchevsky, *History of Russia* (Eng. trans., 3 vols., London, 1911–13).

NOVGOROD-SEVERSK, syâ′vĕrsk. An historic town of Russia, situated in the Government of Tchernigov, on the Desna, 148 miles northeast of Tchernigov (Map: Russia, D 4). It has an old monastery and a Gymnasium. Besides manufacturing and trading there are several tobacco and sugar plantations. At the end of the eleventh century it became the capital of an independent principality and subsequently was annexed to Lithuania. Pop., 1897, 9185; 1910, 12,727.

NOVI, nō′vē, or **NOVI LIGURE**, lē′gōō-râ. A town in the Province of Alessandria, Italy, 33 miles north-northwest of Genoa (Map: Italy, B 2). It has several churches, a lyceum, technical school, museum, and public library. The town carries on manufactures of silk and woolen goods and is the centre of a considerable trade. Novi was the scene, Aug. 15, 1799, of a battle in which the Austrians and Russians defeated the French, the French General Joubert being slain. Pop. (commune), 1901, 17,588; 1911, 20,059.

NOVIBAZAR, nô′vē-bâ-zär′, or **NOVIPAZAR** (Turk. *Yenibazar*). A town in the west-central part of Servia, on the Rashka, an affluent of the Ibar, 20 miles from the Montenegrin border (Map: Balkan Peninsula, C 3). The town has important fairs and an active agricultural trade. There are remains of an ancient citadel, and in the vicinity rises the church of Sts. Peter and Paul, the scene in 1143 of Stephen Nemanya's conversion from the Roman to the Greek church. Under Turkish rule Novibazar was long the capital of a sanjak of the same name in the Vilayet of Kossovo. It was garrisoned by Austria-Hungary, in accordance with the Treaty of Berlin, from 1878 to 1909, when it was restored to the Turks as partial compensation for the annexation of Bosnia and Herzegovina to the Dual Monarchy. In the course of the Balkan War (q.v.) a Servian army occupied Novibazar on Oct. 23, 1912. The town was definitely transferred to Servia by the treaties of London (May 30, 1913) and Bucharest (August 6). The district about the town is the Rassia of the Byzantine historians. Pop., 1911, 13,432, chiefly Serbs.

NOVIE DUBOSARY, nō′vyâ dōō′bŏs-să′rē. A town of Russia. See Dubosary.

NOVIKOV, nō′vē-kôf, Nikolai Ivanovitch (1744–1818). A Russian journalist and philanthropist, born at Avdotyino, Province of Moscow. He entered the civil service at 18 and was conspicuous in Catharine II's Reform Commission (1767), but retired in 1768 to devote himself to literature. In his satirical magazines, the *Drone* (*Truten*, 1769–70) and the *Painter* (1772–73), he ridiculed Gallomania (according to Novikov foreign influence was responsible for all Russian evils) and combated serfdom and other evils of social and private life. A controversy with Catharine's satirical journals brought him into disfavor and his periodicals were stopped. He retired to Moscow, where he leased the Moscow *Gazette* (*Viedomost*) with its printing plant for 10 years (1779–89) and endeavored to spread a love for literature by printing cheap books, many of which he gave away. His devotion to Freemasonry and his very extensive philanthropic work brought him into trouble, but not until the French Revolution did Catharine take any severe measures. In 1792 he was imprisoned, his property confiscated, and the hospitals, schools, libraries, bookstores, etc., opened by him were closed. Released by Paul I, he was confined to Avdotyino until his death. He published, in 1772, *An Attempt at a Lexicon of Russian Authors*, and in 1773–75 a collection of historical materials called *The Old Russian Library* (2d ed., 1788–89; republished by Myshkin, 1894). Consult a monograph by Nezelenov (St. Petersburg, 1875); Luginov, *Novikov and the Moscow Martinists* (Moscow, 1867), and a biographic article by Modzalevski in *Russkii Bibliofil* (St. Petersburg, 1913).

NOVIKOV, Olga (1840–). A Russian journalist and political agent, who lived long in England. She was born in Moscow of noble parents named Kiréev and married General Novikov at the age of 19. Under her maiden initials, O. K., she contributed a great deal to the newspapers of the two nations, hoping to promote an alliance between them, and she made warm friends among British statesmen and historians, notably Gladstone, Froude, Kinglake, and Carlyle, the first of whom sympathetically reviewed her *Russia and England* (1880) in the *Nineteenth Century*. Russian diplomacy, however, did not share her views on Russia's internal politics, and she therefore failed to hold official recognition in England. For a long period, however, she was an ardent advocate, both in her own country and in England, of the cause of the Anglo-Russian entente. She published: *Is Russia Wrong?* (1877); *Friends or Foes* (1878); *Skobelev and the Slavonic Cause* (1884). After her husband's death Madame Novikov spent most of her time on her son's estates near Tambov, Russia. Consult *The M. P. for Russia: Reminiscences and Correspondence of Madame Olga Novikoff*, edited by W. T. Stead (2 vols., New York, 1909).

NOVI LIGURE, nō′vē lē′gōō-râ. A town in Italy. See Novi.

NO′VIOMA′GUS. See Lisieux.

NOVIPAZAR. See Novibazar.

NOVIZE VON PALERMO, nô-vēt′sâ fôn pâ-lĕr′mô, Die. See Liebesverbot, Das.

NOVOCHERKASK, nō′vô-chĕr-kâsk′. A city of Russia. See Novo-Tcherkask.

NOVOGEORGIEVSK, nô′vô-gē-ôr′gē-yĕfsk. A town in the Government of Kherson, Russia, on the right bank of the Dnieper, 250 miles north of the city of Kherson. Milling, tallow boiling, tanning, and brewing constitute the chief industries. In the vicinity of the town are granite and limestone quarries. A fort was erected here by the Poles in 1615. Pop., 1897, 11,200; 1910, 14,893.

NOVOGEORGIEVSK, nō′vō-gē-ōr′gē-yĕfsk. A strong fortress of Russian Poland, strategically the most important point in the military defenses of that region, situated in the Government of Warsaw, at the confluence of the Bug and the Vistula, 9 miles northwest of Warsaw (Map: Russia, B 4). The principal fortifications, on the right bank of the Vistula, consist of a citadel and barracks surrounded by strong walls. The left bank of the Vistula and the banks of the Bug are also fortified. The place was originally fortified by Charles XII of Sweden, and the fortifications were extended by Napoleon in 1807. The Russians captured it in 1813 and it was occupied by the Poles during the insurrection of 1830. The site of the fortress was formerly occupied by the town of Modlin and the fortress is still known to the Poles under that name. Novogeorgievsk was captured by the German forces in the European War which began in 1914. See WAR IN EUROPE.

NOVOGRAD-VOLYNSK, nō′vō-grȧd-vō-lĭnsk′. A district town in the Government of Volhynia, Russia, situated on the Slutch, 55 miles northwest of Zhitomir (Map: Russia, C 4). It manufactures leather, soap, and brick. Pop., 1897, 16,900; 1911, 22,809, about one-half Jewish.

NOVOMOSKOVSK, nō′vō-mŏs-kôfsk′. A town in the Government of Ekaterinoslav, Russia, situated on the Samara, 19 miles northeast of Ekaterinoslav (Map: Russia, E 5). It is known for its horse fairs, and manufactures leather. Pop., 1897, 12,862; 1911, 22,200.

NOVOROSSISK, nō′vō-rŏs-sēsk′. The principal city in the Government of Tchernomorsk, Caucasus, on the Black Sea (Map: Russia, E 6). It is a seaport town situated on an extensive bay protected by a large mole. The Russian Standard Petroleum Works, in Novy Gorod, lie to the north of this bay, as do also a large grain elevator and an important railroad station. There is a considerable traffic in grain and naphtha. Pop., 1911, 61,188.

NOVOSYBKOV, nō′vō-sĭp′kôf. A district town in the Government of Tchernigov, Russia, situated 101 miles north of Tchernigov (Map: Russia, D 4). It lies in a marshy region and is unhealthful. It has numerous tanneries, slaughterhouses, and tallow-melting establishments. Pop., 1913, 21,500.

NOVO-TCHERKASK, chĕr-käsk′, or **NOVO-CHERKASK.** The capital of the territory of the Don Cossacks, South Russia, situated near the right bank of the Don, 20 miles by rail northeast of Rostov-on-the-Don (Map: Russia, F 5). The educational institutions include two Gymnasia, a Realschule, a theological seminary, a seminary for teachers, and a technical school. There are two theatres, a museum containing the archives, and a public library. Up to 1914 distilling was the principal industry. Here are held two annual fairs of considerable importance. About 19 miles north of the town are the Grushev mines, producing one of the best kinds of anthracite in the world. Pop., 1908, 49,559; 1913, 67,000.

NOVO-UZENSK, -ōō-zĕnsk′. A town in the Government of Samara, Russia, situated on the river Uzen, 242 miles south-southwest of Samara (Map: Russia, G 4). Its annual fairs are of considerable importance in the trade with the Kirghiz Steppe. Pop., 1897, 13,475; 1911, 18,075.

NOVOYE VREMIA, nō′voi-ȧ vrā′myȧ (Russ., new time). The largest political daily in Russia, founded in 1868 and published at St. Petersburg. After several years of precarious existence it was acquired by the prominent publicist A. S. Suvorin in 1876, and for a time counted among its contributors Nekrasov, Shtchedrin, and Sophie (Sonya) Kovalevsky.

NO′VUM OR′GANUM (Lat., new instrument). The name of Francis Bacon's great work which led the way to the development of modern inductive logic. See BACON, FRANCIS.

NOVY, nō′vĭ, FREDERICK GEORGE (1864–). An American bacteriologist, born in Chicago. He graduated in 1891 as M.D. from the University of Michigan, and studied also at the Koch Institute, Berlin (1888), at Prague (1894), and at the Pasteur Institute, Paris (1897). In 1887 he joined the faculty of his alma mater, becoming professor of bacteriology in 1902. In 1907 he discovered the spirochæta of the American variety of relapsing fever. Among his writings are: *Ptomaines, etc.*, with V. C. Vaughan (1888; 4th ed., 1902); *Directions for Laboratory Work in Bacteriology* (1894; 2d ed., 1899); *Disinfection of Rooms* (1898); *The Germicidal Properties of Nucleins* (1903), with Charles T. McClintock.

NOWACK, nō′väk, WILHELM (1850–). A German Old Testament scholar. He was born in Berlin, was educated at the universities of Berlin and Halle, was pastor at St. Gertrud's, Berlin, in 1876 and at the Rummelsburg orphan asylum from 1877 to 1880, and held university chairs at Berlin and (after 1881) at Strassburg. Among his many important publications are: *Die Bedeutung des Hieronymus für die alttestamentliche Textkritik* (1875); a commentary on Hosea (1880); a version of the Psalms with commentary (1888); *Das soziale Problem in Israel* (1892); *Lehrbuch der hebräischen Archäologie* (1894); *Die Entstehung der israelitischen Religion* (2d ed., 1896); commentaries on the Minor Prophets (2d ed., 1903), Judges and Ruth (1900), Samuel and Kings (1902); and a text of the Minor Prophets (1906). In 1892 he began a *Handkommentar zum Alten Testament*, in which several of the commentaries mentioned appeared.

NOWANAGAR, nō-wä′nŭg′ar, **NAWANAGAR,** or **NOWANUGGUR.** A seaport and capital of a native state of the same name in the peninsula of Kathiawar, Bombay, India, at the mouth of the Nagna, 160 miles west by south of Ahmedabad. The town is encircled by a fortified wall which is about 4 miles in length, and the buildings generally are of stone. It has pearl fisheries, manufactures of cloth, silk, gold and silver embroidery, perfumed oils, dye goods, and enjoys a considerable coastwise and inland trade. Pop., 1901, 53,844; 1911, 44,887.

NOWATA, nō-wä′tȧ. A city and county seat of Nowata Co., Okla., 23 miles south of Coffeyville, Kans., on the Missouri Pacific Railroad (Map: Oklahoma, F 2). It is in a rich oil and natural-gas region and there are important farming and stock-raising interests. The water works are owned by the city. Pop., 1900, 2223; 1910, 3672.

NOWELL, nō′ĕl, ALEXANDER (?1507–1602). An English divine and schoolmaster, educated at Brasenose College, Oxford. He was master of Westminster School from 1543 to 1555, and after a brief exile during the reign of Queen Mary, became dean of St. Paul's. He founded a grammar school at Middleton in Lancashire, established scholarships at his alma mater, and was frequently consulted on the drafting of statutes for schools. His further activity in educational matters was in connection with the writing of catechisms. Three of these are associated with his name: (1) the larger catechism, summarizing the doctrines of the church of England and suitable for universities, appeared in 1570; (2) the middle catechism was published in the same year; and (3) the small catechism (*Catechismus Parvus*) was published in 1572 and remained the school religious manual in England for nearly two centuries. Consult F. Watson, *English Grammar Schools to 1660* (Cambridge, 1908).

NOWELL, INCREASE (1590–1655). An American colonist, born in England. He was one of the patentees of the Massachusetts Bay Company, was chosen an assistant, and accompanied John Winthrop to America in 1630. He became one of the leading spirits of the little Colony, was the most important man among the 13 who founded Charlestown, and was chosen ruling elder of their church. He became convinced that the union of church and state as exemplified in the constitution of the Colony was unscriptural, and resigned the eldership. He had the conspicuous courage to preach and write against the Puritan custom of wearing long hair as a sign of official rank. He was at various times secretary of the Colony, treasurer of Harvard College, town clerk, and chaplain to the forces employed against the Narraganset Indians. Consult W. I. Budington, *History of the First Church, Charlestown* (Boston, 1845).

NOX, or **NYX** (Lat., from Gk. νύξ, night). The personification of night, conceived as a still, dark figure covering the world with her huge wings and in her kindness bringing rest to men. In Hesiod's *Theogony* she and Erebus are the offspring of Chaos, and from their union spring Æther (air) and Hemera (day). Of herself she produces Sleep and Death and a multitudinous progeny, some friendly like the Hesperidæ, others grievous to men, as the Mœræ, or Fates, Ker, the goddess of violent death, Nemesis, the dreams, Momos, the faultfinder and mocker; while in Æschylus the Furies hail her as mother. The vagueness of the personification and the transparency of the name prevented Nox from becoming prominent in the cult, and for the same reason the type in art is not distinct, though the figure is found on some vases and sarcophagi.

NOYADES, nwä′yäd′ (Fr., drownings). See CARRIER.

NOYAU, nwä′yō′ (Fr., kernel), or CRÊME DE NOYAU. A liqueur commonly made from white brandy, flavored with bitter almonds or the stones of the cherry, peach, or apricot.

NOYES, noiz, ALFRED (1880–). An English poet, born in Staffordshire, Sept. 16, 1880, and educated at Exeter College, Oxford. His life was early devoted to literature, and first of all to poetry. To the best English and American reviews he contributed numerous poems and critical articles. In 1907 he married Miss Garnett Daniels, daughter of Col. B. G. Daniels, U. S. A. Called to America in 1913 to deliver a course of lectures at the Lowell Institute, Boston, Noyes chose for his subject "The Sea in English Poetry" (published the same year). Yale University honored him with the degree of Litt.D. Noyes is to be regarded as one of the best writers of patriotic, heroic, occasional, and rhetorical verse of his generation. His numerous books of verse and prose, published most of them in New York and all of them in London, include: *The Loom of Years* (1902), poems; *The Flower of Old Japan* (1903), a tale in verse; *The Forest of Wild Thyme* (1905); *Drake* (1908), an English epic; *William Morris* (1908), in the "English Men of Letters Series"; *Collected Poems* (1910); *Robin Hood* (1912); *Tales of the Mermaid Tavern* (1912); *The Winepress: A Tale of War* (1914); *A Belgium Christmas Eve* (1915), being *Roda* (1914) rewritten and enlarged as an episode of the Great War.

NOYES, ARTHUR AMOS (1866–). An American chemist, born at Newburyport, Mass. He graduated in 1886 at the Massachusetts Institute of Technology, where, after studying at the University of Leipzig (Ph.D., 1890), he was instructor (1890–94), assistant and associate professor (1894–99), professor of theoretical chemistry after 1899, director of the research laboratory of physical chemistry (1903–07, 1909 et seq.), and acting president (1907–09). He contributed the results of his researches mostly to the *Zeitschrift für physikalische Chemie*, many of his papers dealing with the application of the law of mass action to the solubility of salts in solutions of other salts. Practically all our knowledge on this important subject of physical chemistry is due to the researches of Noyes. Another important series of papers deals with the number of molecules that take part in certain inorganic reactions. Several of his papers deal with synthetic problems in the chemistry of the compounds of carbon. He edited the *Review of American Chemical Research* (1895–1901) and was president of the American Chemical Society (1904). His book-form publications include the following: *Course of Instruction in the Qualitative Chemical Analysis of Inorganic Substances* (1895; 5th ed., rev., 1914); *Laboratory Experiments on the Class Reactions and Identification of Organic Substances* (1899), with Dr. Mulliken; *General Principles of Physical Science* (1902); *Electrical Conductivity of Aqueous Solutions* (1907); *The General Principles of Chemistry* (1914), with M. S. Sherrill. In 1915 he became one of the editors of the *Proceedings* of the National Academy of Sciences.

NOYES, CROSBY STUART (1825–1908). An American journalist, father of Frank Brett Noyes. He was born at Minot, Me., graduated from Bowdoin College, engaged in newspaper work in Maine, and in 1848 became connected with the Washington *News*. In 1855 he crossed the continent on foot, and contributed special articles on his trip to the Portland *Transcript*. The rest of his journalistic career was spent in Washington, and he became especially known for his work on the Washington *Star* during the Civil War. In 1867 he and other newspaper men bought the *Star*, which was reorganized as the *Evening Star*, with Noyes as editor in chief.

NOYES, FRANK BRETT (1863–). An American newspaper editor and publisher, son of Crosby Stuart Noyes. He was born in Washington, D. C., where he was educated in the public schools and in the preparatory department of Columbian College (now George Washington University). From 1881 to 1901 he was manager of the Washington *Star* and in 1902–09 editor of the Chicago *Record-Herald*. He became director of the executive committee in 1894 and president in 1900 of the Associated Press. After 1910 Noyes was president of the Evening Star Newspaper Company of Washington.

NOYES, Henry Drury (1832–1900). An American ophthalmologist. He was born in New York City, graduated from New York University in 1851 and from the College of Physicians and Surgeons in 1855, and from 1868 to 1900 was professor of otology and ophthalmology in Bellevue Hospital Medical College. Dr. Noyes was one of the founders of the American Ophthalmological Society in 1864 and was its president from 1878 to 1884. Among his works are *A Treatise on Diseases of the Eye* (1881) and *A Text-Book on Diseases of the Eye* (1890; 2d ed., 1894).

NOYES, John Humphrey (1811–86). The founder of Oneida Community (q.v.). He was born Sept. 6, 1811, at Brattleboro, Vt., studied theology at Andover and Yale, and became a Congregational minister. In 1834 he founded the sect known as Perfectionists or Bible Communists at his parents' home, Putney, Vt. He married one of his converts and thus secured the means to establish a community in which all things were held in common. Internal dissensions and external opposition dissolved the community, but about 150 of the members soon assembled again at Oneida, N. Y. Noyes remained the leader of the society until the latter part of the seventies, when he was obliged to flee to Canada to escape prosecution because of his marriage system. He died in Canada, April 13, 1886. He wrote: *The Berean* (1847); *Bible Communism* (1848); *History of American Socialisms* (1870).

NOYES, Walter Chadwick (1865–). An American lawyer and jurist. He was born at Lyme, Conn., studied at Cornell University, and was admitted to the bar in 1886. He served as judge of the Court of Common Pleas of New London Co., Conn., from 1895 to 1907, and from the latter year until 1913 was United States circuit judge of the second circuit. He then took up law practice in New York City, and in 1915 was appointed receiver of the Chicago, Rock Island, and Pacific Railroad by Judge Mayer. In 1909 and 1910 he was United States delegate to the International Conference on Maritime Law, at Brussels. He is author of *The Law of Intercorporate Relations* (1902; 2d ed., rev., 1909); and *American Railroad Rates* (1905).

NOYES, William Albert (1857–). An American chemist, born near Independence, Iowa. He graduated at Iowa (now Grinnell) College (1879) and at Johns Hopkins University (Ph.D., 1882). From 1883 to 1886 he was professor of chemistry at the University of Tennessee; held a similar post at the Rose Polytechnic Institute, at Terre Haute, Ind., from 1886 to 1903; was chemist for the National Bureau of Standards in 1903–07; and thereafter was professor of chemistry and director of the chemistry laboratory at the University of Illinois. He edited the *Journal of the American Chemical Society* after 1902 and the *Chemical Abstracts* in 1907–09. His researches served to throw some light on the constitution of camphor and allied compounds. He wrote *The Elements of Qualitative Analysis* (1887; 6th ed., rev., 1911); *Organic Chemistry for the Laboratory* (1897; 2d ed., rev., 1911); *Organic Chemistry* (1903; 2d ed., 1911); *Text-Book of Chemistry* (1913).

NOYES, William Curtis (1805–64). An American lawyer, born at Schodack, Rensselaer Co., N. Y. He began to practice law in 1827, in Oneida County, where he quickly took high rank. He removed to New York in 1838, where he soon became eminent in his profession, and in 1857 was appointed, with Alexander W. Bradford and David Dudley Field (q.v.), to codify the laws of the State. In politics he was at first an antislavery Whig and afterward joined the Republican party. In 1861 he was a member of the Peace Convention (q.v.) held in Washington just before the outbreak of the Civil War. In this body he labored earnestly to maintain the Union while vindicating the position taken by the loyal States. In the same year he was a candidate of the Republican party for the United States Senate. Noyes was counsel in many cases of high importance, and as an equity lawyer and cross-examiner was famous. He bequeathed a valuable law library to Hamilton College.

NOYON, nwä'yôɴ′. A town in the Department of Oise, France, on the Verse, 59 miles northeast of Paris (Map: France, N., H 3). Its cathedral, founded by Pepin the Short and rebuilt in 1150, is built in the transitional style. The principal industries are sugar refining and the manufacture of cloth, laces, leather, beer, and chemicals. Pop., 1901, 7443; 1911, 7277. Noyon, ancient Noviodunum Veromanduorum, was prominent in Merovingian and Carolingian times. John Calvin was born in the town of Noyon in 1509.

NOZZE ALDOBRANDINI, nô′tså äl'dô-brän-dē′nē. See Aldobrandini Marriage.

NOZZE DI FIGARO, dē fē′gȧ-rô, Le (It., Marriage of Figaro). An opera by Mozart, first produced at Vienna, May 1, 1786; in the United States, May 3, 1823 (New York).

NÛ, nōō, or **NUU**, nōō (later form Nûɴ). An Egyptian deity personifying the primeval waters of the sky whence the sun god Rē emerged to govern the world. Nû was regarded as the father of all the gods and the ultimate source of all created things. In a later phase of Egyptian theology he was often identified with the sky and the heaven above it, and he even was considered to represent, along with his spouse Nût, the waters of the Nile or the ocean. He was, says Budge, the inert mass of watery matter out of which the world was created. This Nût, whose name is merely the feminine of Nû, must not be confounded with Nût (q.v.), the goddess of the sky. Consult: K. R. Lepsius, *Ueber die Götter der vier Elemente* (Berlin, 1856); H. K. Brugsch, *Religion und Mythologie der alten Aegypter* (Leipzig, 1888–90); Alfred Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); E. A. T. Wallis Budge, *The Gods of the Egyptians*, vol. i (London, 1904).

NUANCES, nụ'äɴs′ (Fr., shades). In music, the various shadings and means of expression in the interpretation of a composition. The term includes everything that enters into the finished rendering of a composition, such as acceleration or retarding of tempo, the degree of loudness of different tones, the execution of embellishments, rhythmic accentuation, phrasing, etc. Nuances constitute the individuality of the style of interpreters.

NŪBA, nōō'bȧ. A term brought into prominence in ethnology by Friedrich Müller in association with Fulah in his Nuba-Fulah linguistic family. The Nubas are true negroes, having their home in Kordofan, eastern Sudan, whence they spread into Darfur and Wadai. They are classified as (1) Nubas proper (Nuba, Kargo, Kulfan, Kolaji, Tumali), living in central and southern Kordofan, Dar-Nuba (Ar. *dar*, land), and (2) Nilotic Nubas. Consult Müller, *Allgemeine Ethnographie* (Vienna, 1879), and Stanford, *Africa*, vol. i (London, 1895).

NUBAR PASHA, nōō'bär pȧ-shä' (1825–99). An Egyptian statesman, born in Smyrna and brought up as a Christian. He was educated in Europe. After having been sent on frequent diplomatic missions he was appointed in 1854 Ambassador at Vienna. The first Egyptian railway was built under his direction, and he concluded with the Powers negotiations for the construction of the Suez Canal (1864). As Minister of Foreign Affairs in 1867–74 and again in 1875 and 1876, he organized mixed courts for the adjudication of causes between Europeans and Egyptians. Falling into disfavor on account of his pro-English policy, he was dismissed and went to Europe, but was recalled in 1878 upon the request of England and was again Premier in 1878–79, 1884–88, and 1894–95.

NU'BIA. An extensive region in northeastern Africa, lying between Egypt proper and Kordofan. Its limits have always been indefinite, and it may be roughly described as lying between the parallel of Khartum and that of the First Cataract and extending from the Red Sea to the Libyan Desert (Map: Africa, H 2). Vegetation is confined to a few scattered oases and to the very narrow valley of the Nile, which traverses the region in an extremely tortuous course, receiving the Bahr el Azrek, or Blue Nile, in the south and, farther down, the Atbara. The remainder of the country consists of the sandy and rocky wastes known as the Nubian Desert, which towards the south begins to be covered with euphorbias and aloes as it merges into the tropical savanna lands. The chief products of the oases are dates and gums, the latter derived chiefly from the acacias. The population consists partly of Hamitic and Arabian elements, partly of Nubians. The chief towns of the region are Omdurman, Khartum, Berber, and El Ordeh on the Nile, and the port of Suakin on the Red Sea.

History. Nubia was a part of the ancient Ethiopia. The name seems to have been derived from the Egyptian and Coptic *noub* (gold), a name still retained in Wady Nouba. The dominion of the Pharaohs, when most extended, reached to the isle of Argo, the last place where the monuments of the Egyptians have been found. Under these monarchs Nubia was governed by a royal scribe, entitled Prince of Cush or Ethiopia, till the twentieth dynasty, when it appears to have been recovered by a series of native rulers, who ultimately conquered Egypt and, although driven back, finally extended their rule from Meroë to Syene (Assuan), the most southern city held by the Egyptian monarchs and the Romans. Diocletian removed a negro tribe, called Nobatæ, to the district above Syene, to oppose the Blemmyes, who inhabited the western desert, now held by the Ababde and Bisharin Arabs. The Nobatæ and the Blemmyes intermingled, forming a negroid race which about the middle of the sixth century was converted to Christianity, and under Silko a powerful Christian state was established with Dongola as its capital. The Arabs made little headway against the rulers of the Christian kingdom until the fourteenth century, when Dongola fell, and the country was divided into a number of petty states. It was subdued by Mehemet Ali of Egypt in 1820–22 and remained under Egyptian control until it fell into the hands of the Mahdists in 1884–85. (See MAHDI.) The victories of the Anglo-Egyptian army under Lord Kitchener (1896–98) reëstablished the authority of the Egyptian government over Nubia. In 1915 it became British, when Egypt was completely annexed by the British Empire during the European War which broke out in 1914. See EGYPT; SUDAN. For a description of the peoples of Nubia, see AFRICA, *Ethnology;* HAMITES; NEGRO; NUBIA.

ÑUBLE, nyōō'blȧ. One of the best-populated provinces of Chile (Map: Chile, E 5). Its area is 3407 square miles. The eastern part belongs to the slope of the Andes, but the western section is generally level, flat, and very fertile. The climate is healthful and favorable for the cultivation of grain. Nuble is one of the chief wheat-producing provinces of Chile. It affords good pasturage for cattle. Pop., 1895, 152,935; 1907, 166,245. Capital, Chillan (q.v.).

NUCEL'LUS (Neo-Lat., from Lat. *nucella*, dim. of *nux*, nut). The body of the ovule of seed plants, which is invested by one or two integuments. The nucellus is the essential part of the ovule (q.v.), as it contains the spore (megaspore, later the embryo sac) in which the embryo is developed.

NŪCLEIN, nū'klē-ĭn (from Lat. *nucleus*, kernel). The complex chemical substance existing in the nucleus of cells, by virtue of which the cell grows, develops, and reproduces. It exists most abundantly in the white blood corpuscles and is liberated when these undergo disintegration. In bodily infections such as pneumonia, leucocytosis is very active, and the blood stream becomes more or less saturated with nuclein, to which its germicidal properties are largely due, according to Vaughan; some authors even referring to it as the natural antitoxin. Other investigators believe that this germicidal quality is due to substances poured into the blood by the ductless glands (see SECRETIONS, *Internal*), particularly the pituitary, suprarenal, thyroid, and thymus glands. Chemically nuclein is made up of a complex proteid base and nucleinic acid and contains from 5 to 9 per cent of phosphorus. Nuclein is given most effectively by hypodermic injection. It is prepared commercially from yeast and occurs as an amorphous substance rich in phosphorus. Its approximate chemical formula is $C_{29}H_{49}N_9P_3O_{22}$.

NU'CLEUS (Lat., little nut, kernel). A small body, usually spheroidal or ellipsoidal in form, which stains deeply and lies within the cytoplasm of the cell. It is generally regarded as a controlling centre of cell activity, and hence as a primary factor in growth, development, and the transmission of specific qualities from cell to cell, and so from one generation to another. In its improperly called resting phase the nucleus is globular and surrounded by a membrane. Within it there is an irregular network. The nucleus of certain tissue cells and of some unicellular organisms has been observed to undergo amœboid movements. In ciliate Infusoria a large macronucleus and one or more micronuclei may be present in one and the same cell. Besides (1) a nuclear membrane, (2) a network or reticulum, (3) more or less rounded and irregular bodies, the nucleoli, exist in the nucleus, and (4) a clear nuclear sap, or karyolymph. See Cell; Embryology; Mitosis.

NUCULA, nū′kū-lȧ. A genus of small pelecypods with two long series of hinge teeth meeting below the beaks, especially remarkable for the fact that it has continued unchanged from the Silurian times to the present era. There are about 200 fossil species and half as many recent ones.

NUDIBRANCHIATA, nū′dĭ-brăŋ′kĭ-ā′tȧ (Neo-Lat. nom. pl., from Lat. *nudus*, naked + *branchiæ*, from Gk. *βράγχια*, *branchia*, gills). A suborder of opisthobranch gastropods, hermaphroditic, destitute of shell, the primary gills completely aborted, and the secondary gills on the back of the body. Jaws and a well-developed radula are almost always present. The nudibranchs are often called sea slugs. One (*Æolis pilate*) is common on the New England coast just below low-water mark. All the sea slugs lay their eggs in jelly-like masses coiled up on stones and seaweeds. Though the adults are shell-less, the embryos at first have a shell, indicating that the nudibranchs have descended from shelled gastropods. See Gastropoda; and accompanying Colored Plate of Sea Slugs.

NUECES, nū̇-ā′sȧs. A river of south Texas (Map: Texas, C 5). Its main forks rise in the eastern part of Edwards County and flow southward through the mountains of the Edwards plateau. Thence its course is southeasterly to Corpus Christi Bay. Its length is 310 miles and its drainage area 18,944 square miles. There are many irrigation plants in its watershed in Edwards County. Under the Mexican régime it was the legal western boundary of the Province of Texas.

NUELSEN, nụl′*zen*, John Louis (1867–). An American Methodist Episcopal bishop and theologian, born in Zurich, Switzerland. He received his preparatory education in Germany, graduated from Drew Theological Seminary (Madison, N. J.) in 1890, and after two years of teaching was fellow at Berlin and Halle (1892–93). He had entered the ministry in 1889. From 1894 to 1899 he served as a professor at Central Wesleyan College (Warrenton, Mo.) and from 1899 till his election as Bishop in 1908 as a professor in Nast Theological Seminary (Berea, Ohio). In 1912 Nuelsen was placed in charge of all Methodist work in continental Europe, with Zurich as his residence. Besides editing the *Deutsch-Amerikanische Zeitschrift für Theologie und Kirche* (1897–1908) and doing much other similar work, he wrote: *Die Bedeutung des Evangeliums Johannes* (1903); *Das Leben Jesu in Wortlaut der vier Evangelien* (1904); *John Wesley, ausgewählte Predigten* (1905); *Luther the Leader*, in "Men of the Kingdom Series" (1906); *Kurtzgefasste Geschichte Methodismus* (1907); *Recent Phases of German Theology* (1908); *Methodismus und Weltmission* (1913).

NUEVA CÁCERES, nwā′vȧ kä′thȧ-rȧs. The capital of the Province of Ambos Camarines in southern Luzon, Philippines. It is situated at the foot of Mount Isarog, 10 miles south of the Bay of San Miguel, and at the head of navigation for steamers of 300 tons on the Naga River (Map: Philippine Islands, D 4). It is an important road centre, a port of entry and telegraph station, and has a cathedral, a bishop's palace, a seminary, and a normal school. Pop., 1903, 17,943. Nueva Cáceres was founded in 1578 and was at first called Naga. It was at one time the chief bishop's see for the whole archipelago.

NUEVA ÉCIJA, ā′thē̇-hȧ. A province of central Luzon, Philippine Islands. It has an ocean frontage of 23 miles on the east coast of Luzon and extends westward to the centre of the island, its southwest corner being 30 miles north of Manila Bay (Map: Philippine Islands, C 3). Area, 3840 square miles. The numerous river valleys are covered with a rich alluvial soil, the chief products of which are rice, corn, tobacco, sugar cane, coffee, and palay. Many cattle are raised. There is a large boat traffic on the rivers, and a network of roads covers the greater part of the province. Pop., 1903, 134,147, of whom 86,506 were Tagalogs and 40,734 were Ilocanos. The capital of the province is San Isidro (q.v.).

NUEVA SAN SALVADOR, nwā′vȧ sän säl′vȧ-dōr′. A town of Salvador. See Santa Tecla.

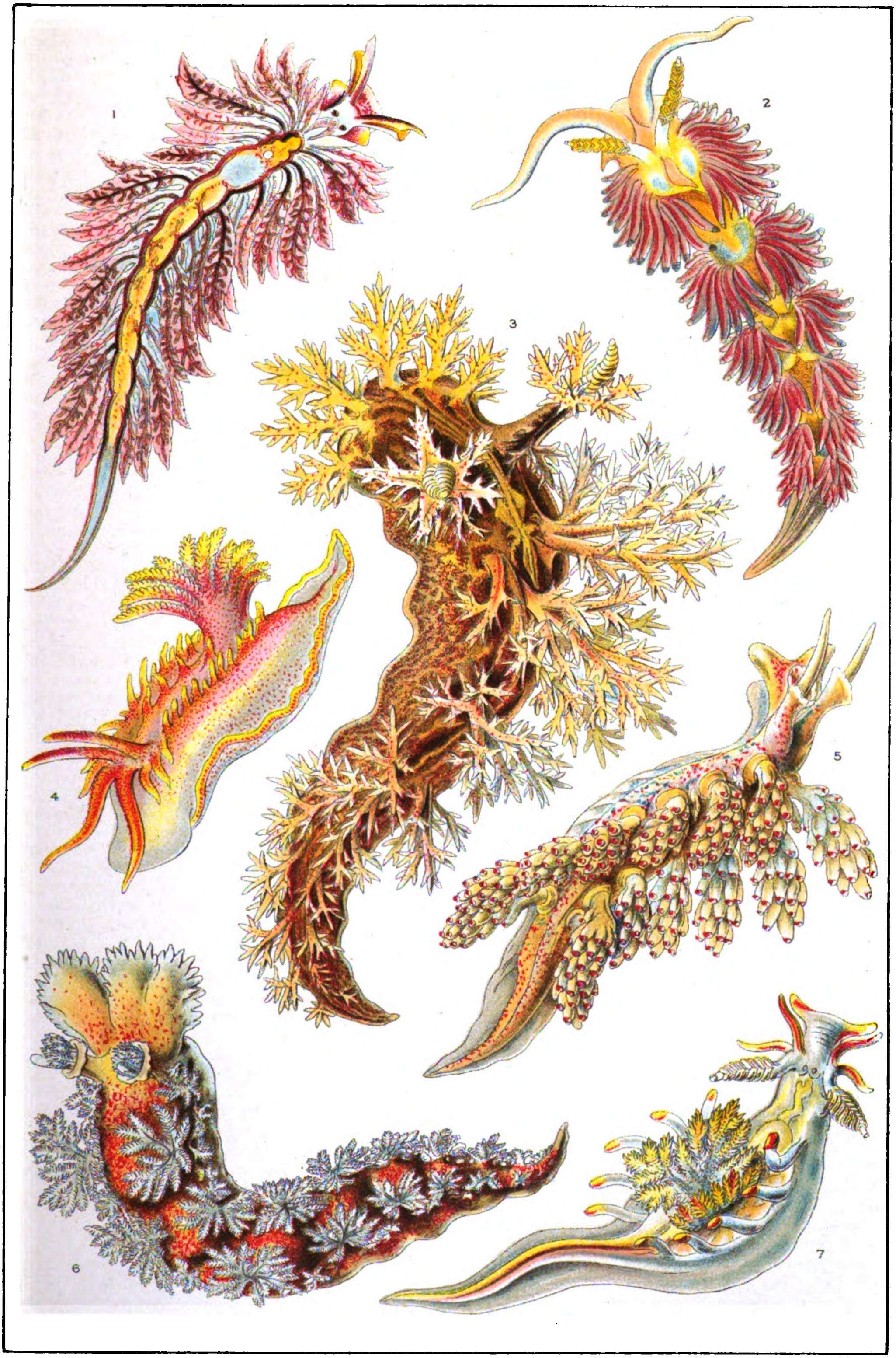
NUEVA VIZCAYA vēth-kä′yȧ. An inland province of northern Luzon, Philippine Islands (Map: Philippine Islands, C 2). Area, 1075 square miles. Almost the whole of the province is broken by the forest-covered foothills of the Sierra Madre on the east and the Cordillera Central on the west. Magat River, a tributary of the Río Grande de Cagayán, runs through the province from north to south. There are practically no manufactures or trade, even agriculture yielding scarcely enough for home consumption. The greater part of the province is inaccessible and is inhabited by savage tribes. Pop., 1903, 62,541, of whom 16,026 were civilized. The capital is Bayombong (q.v.).

NUEVITAS, nwȧ-vē′tȧs. A town of the Province of Puerto Príncipe, Cuba, on the coast, 39 miles east of Puerto Príncipe, with which it is connected by rail (Map: Cuba, H 5). It has a good harbor and is the most important port of the province. Its chief industries are sponge and tortoise-shell fisheries. It is the seat of a United States consular agent. Pop., 1899, 4228; 1907, 4386.

NUEVO LAREDO, nwā′vō̇ lȧ-rā′dō̇. A frontier town in the State of Tamaulipas, Mexico, situated on the south bank of the Rio Grande, opposite Laredo, Tex. (Map: Mexico, J 4). The town is one of the crossing points between Mexico and the United States of the National Railways of Mexico. It is the seat of a United States consul. Pop., 8000. The town was burned by the Federals in April, 1914.

NUEVO LEÓN, lȧ′ōn′, or New Leon. An inland state of Mexico (Map: Mexico, J 5). Area, 25,027 square miles. The state belongs partly to the Mexican plateau and is partly traversed by the eastern Sierra Madre. In the north and northeast the country is low and slopes towards the Rio Grande. The rivers are numerous, but none of them suitable for navigation. The climate is not unhealthful, but the rainfall is irregular and droughts occur frequently. The soil is fertile. Agriculture, mining, and smelting are the chief industries. The principal products are cereals, sugar cane, and fibres. Stock raising is also carried on to some

SEA SLUGS



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1 ÆOLID - HERMÆA BIFIDA.
2 ÆOLID - ÆOLIS CORONATA.
3 DENDRONOTID - DENDRONOTUS ARBORESCENS.
4 DORID - IDALIA ELEGANS.
5 DOTONID - DOTO CORONATA.
6 TRITONID - TRITONIA HOMBERGII.
7 DORID, - ANCULA CRISTATA.

extent. The mineral products include lead, zinc, and silver. Among the manufacturing industries are sugar mills, cotton factories, woolen mills, and iron and steel works. The state has good railway facilities and a considerable trade with the United States and the other Mexican states. Pop., 1910, 365,150. The capital is Monterrey (q.v.).

NUFFAR. See NIPPUR.

NUI'SANCE (OF. *nuisance*, *noicence*, Fr. *nuisance*, from ML. *nocentia*, injury, from Lat. *nocere*, to harm). In common speech, anything which causes unusual and culpable annoyance, disturbance, or offense. As a legal term it is narrower, although scarcely more exact in signification. No definition has been offered which meets with general approval. Perhaps the best brief definition is that of Sir Frederick Pollock: "The wrong done to a man by unlawfully disturbing him in the enjoyment of his property or, in some cases, in the exercise of a common right." It will be noticed that the gist of nuisance is the unlawful disturbance, annoyance, or discomfort which it produces. Accordingly the same act may constitute a nuisance and another form of tort, such as trespass; in which case the injured party may seek redress for either of the two wrongs. This distinction has been recognized by English law from a very early period. Glanville, writing late in the twelfth century, and Bracton, writing in the next century, make it clear to us that the assize of nuisance, or trial by jury in an action for nuisance, was distinct from the assize of novel disseisin, as, later, it was distinct from the action of trespass.

Public Nuisance. Both of these ancient writers distinguish, as does modern law, between public and private nuisances. The former are offenses against the public at large, such as obstructing highways, polluting or diverting public waters, carrying on a business which is dangerous to the public health or offensive to the public, maintaining disorderly houses, or indecent or disgusting exhibitions in a public place. Modern statutes have greatly extended the scope of public nuisances, but this legislation continues to observe the common-law test, viz., the tendency of the prohibited act to debase public morals, to endanger the health of persons generally, or to interfere unlawfully with their convenience. A public nuisance is a criminal offense and punishable as such by the state. If a legal proceeding is instituted for its abatement, this, too, must be brought and prosecuted by the public authorities. An individual will not be allowed to bring an action in his own name, either for damages or for abatement of a public nuisance, unless he can show three things: first, a particular injury to himself beyond that which is suffered by the rest of the public; second, that such injury is direct and not consequential; third, that it is substantial, not fleeting or evanescent. To illustrate: An unlawful obstruction in a highway constitutes a public nuisance, whether it does actual harm or not; but it will not support a private action by one owning property on the highway unless the latter can show that it has caused him special, direct, and substantial damage, such as diverting customers from his store or preventing his passing to and from his premises.

Private Nuisance. An act or omission constituting a private nuisance is not generally a criminal offense. It may be, on the contrary, highly beneficial to the community. The tanning of leather, the manufacture of illuminating gas, or the raising of pigs is a lawful business and may be quite necessary; but if it is conducted in such proximity to any dwelling as to inflict actual injury to property or health or to render the occupancy of the premises specially uncomfortable, it amounts to a private nuisance. It is no justification of such an act or business that its continuance will benefit thousands of people while harming but one. That one is entitled to the law's protection. Nor is it an answer that the business was established and conducted before the injured party erected his dwelling. If it were, the owner of an offensive (though lawful) business could limit the growth of a city in his direction or greatly depreciate the value of surrounding property.

Even when the discomfort or annoyance complained of is not a well-established incident of the plaintiff's surroundings, whether it is sufficient in kind or amount to constitute a nuisance is often a difficult question. It is clear that trifling and temporary discomforts must be put up with. The smoke that may, in certain conditions of the atmosphere, descend from a neighbor's chimney, the odors that may be wafted at times from his kitchen, though offensive and disagreeable, are not a nuisance. Between them and the dense smoke and fumes from a kiln or factory that render breathing difficult and produce nauseating sensations there is debatable ground, on which it is difficult to fix the exact point at which smoke and odors and noises become a nuisance in the eye of the law. On the one hand it is not necessary to prove that they are such as to cause sickness. On the other it is essential to show that they are of a character to damage property sensibly or to render ordinary persons seriously uncomfortable. Offense to an æsthetic taste or a peculiarly sensitive organism is not enough. The discomfort or annoyance must be that of the average person in the particular situation.

The right to maintain a nuisance cannot be acquired by prescription, i.e., by long lapse of time, as against the public, but it may be so gained as against individuals. Even in such cases the right is not easily acquired. The one asserting it must show that for 20 years he has continued the very nuisance openly and notoriously and under a claim of right adverse to that of the person now complaining of it or of his predecessors in title.

In some cases the maintenance of a nuisance may be legalized by statute. The power of the British Parliament in this direction is unlimited. In the United States, Congress and the State legislatures are limited by constitutional provisions. A nuisance which amounts to the taking of private property cannot be constitutionally legalized unless due compensation is made to the victim of the nuisance. Even when the nuisance falls short of a taking of property, a statute purporting to legalize it is construed with much strictness. One who justifies under such a statute is bound to show a clear and unmistakable legislative sanction.

The remedies available to the victim of a private nuisance are three: abatement, a suit for damages, and an injunction. The first he may enforce with or without process of law. For example, he may cut off the boughs of overhanging trees or pull down a ruinous structure that threatens to fall upon his property. One who thus takes the law into his hands needs to act with great care, for, if he does more than is actually necessary to relieve himself of the nuisance, he becomes a wrongdoer himself. If he brings a suit for damages, he is entitled to nominal damages upon proving the nuisance; and in case he shows he has sustained actual damages, he is entitled to those. If the defendant has acted maliciously, he may be compelled to pay punitive damages. (See DAMAGES.) The most efficient remedy, available for a threatened or continuing nuisance, is that of injunction. This is not, however, always available even where the nuisance is such as to entitle the complaining party to recover damages at law. In some states the courts will refuse an injunction where to grant it would work hardship to the defendant or the public out of all proportion to the injury which the continuance of the nuisance may inflict on the complainant. In such a case the plaintiff is relegated to his action for damages. Consult: H. G. Wood, *Law of Nuisances* (3d ed., San Francisco, 1893); E. W. Garrett, *Law of Nuisances* (2d ed., London, 1897); J. A. and H. C. Joyce, *Treatise on the Law Governing Nuisances* (St. Louis, 1906); Sir Frederick Pollock, *The Law of Torts* (8th ed., London, 1908).

NUKHA, nōō-kȧ′. A town in the Government of Yelisavetpol, Transcaucasia, situated about 150 miles northwest of Baku (Map: Russia, G 6). It is the centre of a silk-producing district. The town was formerly the capital of a khanate, and retains the ruins of an ancient palace. Pop., 1897, 24,811; 1911, 41,804, chiefly native Tatars and Armenians.

NULATO, nōō-lä′tȯ. An Alaskan native village on the north bank of the Yukon, above the mouth of the Koyukuk (Map: Alaska, G 3). It has a telegraph office and has long been the central trading station for the natives of the Koyukuk valley. It had the Catholic mission of St. Peter Claver and a government school of 25 pupils in 1913. Pop., 1915, about 300.

NÜLL, nụl, EDUARD VAN DER (1812–68). An Austrian architect, born in Vienna. He studied at the academy and with his fellow student, August von Siccardsburg, aimed at the promotion of the Renaissance style. After a period of travel in Italy, France, England, and Germany, Van der Nüll was professor of architecture and ornament at the Vienna Academy for 21 years (1844–65). Associated in the construction of various noteworthy edifices, the joint activity of Van der Nüll and Von Siccardsburg reached its brilliant climax in the erection of the splendid Vienna Opera House (1861–69). Before its completion the former took his life in a fit of melancholia.

NUL′LA BO′NA (Lat., no goods). The form of words in which a sheriff makes his return of an execution which he has been unable to satisfy out of the goods or personal property of the judgment debtor. The return signifies that after due diligence he has been unable to find goods, or sufficient goods, liable to execution to satisfy the execution. A return of *nulla bona* will not protect the sheriff if he has neglected to use any reasonable means of finding goods of the debtor, nor if he is refused admission to the debtor's premises, nor if he relies on false statements of the debtor as to the ownership of goods in the latter's possession, nor if he fails to levy under a mistake of law as to the liability of goods to seizure. For a false return the sheriff is liable for the value of the goods he might have seized. See EXECUTION; SHERIFF.

NUL′LIFICA′TION (Lat. *nullificatio*, contempt, making as nothing, from *nullificare*, to despise, make as nothing, from *nullus*, none + *facere*, to do, make). In American history, the formal suspension by a State within its territorial jurisdiction of a law of the United States. The right was first asserted in the famous Virginia and Kentucky Resolutions (q.v.) of 1798 and 1799. Jefferson and Madison were the spokesmen of Kentucky and Virginia respectively. In the Kentucky Resolutions of 1798, which were adopted by the Legislature, it was declared that the Union was a compact, and, as in other cases of compact, each party had a right to judge for itself of infractions and of the mode of redress. The resolutions of 1799 went even further and declared that a nullification by the State sovereignties of all unauthorized acts done under cover of the Constitution was the rightful remedy in cases of infraction. The Virginia Resolutions did not go so far, but characterized the Union as a compact and called upon the other States to join her in declaring the Alien and Sedition laws null and void. No further action was taken for the time by these or other States to put into execution the methods of redress here enunciated. Madison asserted in his old age that the Kentucky and Virginia resolutions were planned for political effect. After this there were occasional attempts to defeat the execution of legislative acts or judicial mandates of the United States courts, but with only partial success. Thus, in 1809 the government of Pennsylvania ordered out the militia to resist a mandate of the Federal court. Again, after the enactment of the Embargo Act the governments of several of the New England States, whose commerce and trade had been nearly destroyed, resorted to various means either of judicial construction or evasion to nullify the operation of the United States statute. The second war with Great Britain, which was vigorously opposed in New England, increased the nullification spirit in that section. In several States the operation of Federal enlistment statutes was defeated by the refusal of the State governments to comply with their requirements, and the opposition to the war policy increased to such an extent that a convention was called at Hartford with a view, it was believed, of taking steps towards separation from the Union. (See HARTFORD CONVENTION.) A somewhat successful nullification of the Federal will occurred in Georgia in 1825–29 through the assertion by the State government of jurisdiction over the lands occupied by the Cherokee Indians. In none of these cases was the constitutional right to suspend a law of the United States made the basis of the violation. The first open assertion of nullification as a constitutional right of each individual State appeared in a paper prepared by John C. Calhoun in 1828 for the use of the South Carolina Legislature and entitled *The South Carolina Exposition*. In this paper Calhoun argued that the States were sovereign, that the Federal government was their agent, and that whenever a sovereign State became satisfied that the agent was misusing the powers delegated to it, it was the right of such State to interpose and suspend the operation of the power thus being abused. According to this view the State had only to decide that a given statute of Congress was unconstitutional or oppressive and then, acting through a convention (for Calhoun did not recognize the right of the Legislature in the premises), formally to suspend its further operation within the territory of the State until three-fourths of the States in national convention should declare the suspended act of Congress a valid and reasonable law. In 1830, after the publication of *The South Carolina Exposition*, Senator Robert Y. Hayne (q.v.), from South Carolina, in the celebrated debate with Daniel Webster (on the Foote resolution), made a brilliant defense of the nullification doctrine and insisted, unlike Calhoun, that the formal act of suspension could be made by the Legislature. The immediate occasion for the assertion of the right of nullification by South Carolina was the rapid growth of the system of protective tariffs which it was claimed acted injuriously upon South Carolina and the Southern States generally, where manufacturing industries had not gained a foothold. The Tariff Act of 1824, itself containing high-protective features, had been followed by the so-called tariff of abominations of 1828 and a tariff act but little less favorable of 1832. The time had now arrived for the trial of the new theory, and accordingly the Governor of South Carolina called the Legislature together for such action as it might deem proper. The Legislature summoned a convention representing the sovereignty of the State, and on Nov. 24, 1832, this body passed an ordinance declaring the tariff acts of 1828 and 1832 null and void, prohibited the payment of duties after Feb. 1, 1833, forbade appeals on the questions involved to the Supreme Court of the United States, and declared that if the government of the United States attempted to interfere South Carolina would no longer consider herself a member of the Union. The new Legislature, which met in December, put the State on a war footing and passed a series of acts to enable the State officers to carry out the policy of nullification. Meantime President Jackson took measures to enforce the collection of the duties at Charleston, and on December 11 issued his celebrated proclamation warning the people of South Carolina that they were being misled by designing men, whose object was disunion and treason, and that he had no discretionary duty, but must enforce the laws of the Union. Congress came to his aid and passed the so-called Force Bill in March, 1833, but in the meantime a compromise tariff measure had been agreed upon and made further resort to the Force Bill unnecessary. On March 6 the South Carolina convention met and repealed the ordinance of nullification. The conflict was thus postponed, and whether union or nullification triumphed in this controversy is still a debatable question. Consult: Johnston, in Lalor, *Cyclopædia of Political Science* (New York, 1893); Houston, *A Critical Study of Nullification* (ib., 1896); Powell, *Nullification and Secession* (ib., 1897).

NUL′LIPORE (from Lat. *nullus*, none + *porus*, passage, pore). A general name for the more massive coral-like calcareous algæ that grow on the outside of coral reefs and thus afford some protection to the more delicate corals growing inside. They belong to the Rhodophyceæ. The most important genus is *Lithothamnium*. They are now recognized as contributing an important part in the growth of the coral reef. See CORALLINÆ.

NUL′LITY OF MARRIAGE. Legal invalidity of the marriage relation, resulting either from the fact that the parties thereto were prohibited by law from contracting marriage with one another, or that the marriage was not based on mutual consent, or that it was not effected in the manner prescribed by law. The expression has no reference to conditions arising out of the marriage relation, and accordingly a decree of divorce, in the proper sense of that term, is not a decree of nullity.

Nullity of marriage comprehends two very different situations: first, the case of a union absolutely void ab initio and therefore no marriage at all; and, second, the case of a marriage which because of some vital defect is voidable by appropriate legal proceedings at the instance of the aggrieved party. Of the first class are marriages between two women or two men; bigamous marriages, however innocently contracted; the marriage of an idiot or of a person under the permitted age. Such marriages are said to be void as being good for no legal purpose whatsoever, and require no judicial action to restore the parties to their status as unwedded persons. It is only for additional security or protection that parties to such a union need to invoke the jurisdiction of the courts in order to obtain a formal decree declaring the de facto marriage null and void. The obtaining of such a decree is, however, a matter of right, even though both parties were at the time of the marriage fully cognizant of its nullity, and such an action may be maintained whether in the lifetime or after the death of the supposed husband and wife.

Of the second class of null marriages—distinguished as voidable, and not wholly void—are marriages between parties related within the prohibited degrees of consanguinity or affinity, marriages where one of the parties was induced by fraud or duress, and marriages with persons under a physical disability. Such de facto marriages are valid to all legal purposes until their nullity has been declared by a court in a proper proceeding brought by or on behalf of the aggrieved party. In this class of cases the proceedings must be taken and the decree of nullity entered in the lifetime of both parties. In these cases validity cannot be questioned after the death of either of the parties. The issue of such a marriage born or conceived before its nullity has been declared are legitimate.

Prior to the institution of divorce in Christendom the jurisdiction to declare a marriage null and void was vested in the ecclesiastical courts. It is now generally exercised by the courts empowered to grant divorces. See CONSANGUINITY; DIVORCE; MARRIAGE.

NUMANTIA, nŭ-măn′shĭ-ȧ. The chief town of the Celtiberian people called Arevaci in ancient Spain. It was situated on the Douro (Durius), in the neighborhood of the present Soria, in Old Castile. The site is probably marked by the present Puente de Garray. Numantia is celebrated for the heroic resistance which it made to the Romans, from 153 B.C., when its citizens first met a Roman army in battle, to 133 B.C., when it was taken and destroyed by Scipio the Younger after a siege of 15 months, in the course of which famine and the sword had left alive very few of its 8000 brave defenders. See SCIPIO. In 1905–10 excavations, conducted by A. Schulten, brought to light the Celtiberian town, the lines of Scipio's camp and of other Roman camps, etc. Consult

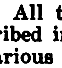
A. Schulten, in *Archäologische Anzeiger* (1905, 1907, 1908, 1909, 1911–1913).

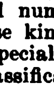
NU'MA POMPIL'IUS. In the mythic history of Rome, the successor of Romulus. He was a native of Cures in the Sabine country, and was universally reverenced for his wisdom and piety. Unanimously elected King by the Roman people, he soon justified by his conduct the wisdom of their choice. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the sacred nymph Egeria (q.v.), to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of Roman ceremonial law. His reign lasted for 39 years. The only feature in the myth of Numa Pompilius which we can regard as probably historical is that which indicates the infusion of a Sabine religious element into Roman history at some remote period. Consult Carter, *The Religion of Numa* (New York, 1906); also: Livy i, 18–21; Plutarch, *Numa;* Dionysius of Halicarnassus, ii, 58–76; G. Cornewall Lewis, *Credibility of Early Roman History* (1855); Ettore Pais, *Ancient Italy*, translated from the Italian by C. D. Curtis (Chicago, 1908); id., *Storia critica di Roma* (Rome, 1913–14).

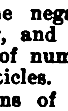
NUMA ROUMESTAN, nụ'mȧ rōō'mĕs'tăɴ'. A romance by Alphonse Daudet (1881), and the name of its chief figure, a typical Provençal who has been identified as Gambetta.

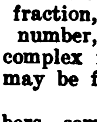
NUM'BER (OF., Fr. *nombre*, from Lat. *numerus*, number; connected with Gk. *νέμειν*, *nemein*, to distribute, and ultimately with Goth. *niman*, OHG. *neman*, Ger. *nehmen*, obsolete Eng. *nim*, to take). Number is the result of counting or of the comparison of a magnitude with a standard unit. This is more precisely expressed by Newton's definition—the abstract ratio of one quantity to another of the same kind. If a name is attached to the abstract number to indicate the nature of the quantity measured, the resulting number is said to be concrete. Thus, the ratio of the length of a room to one yard may be the abstract number 5; but 5 yards, the measure of the length of the room, is a concrete number. Of course, however, the number part is abstract in any case, merely having some metrical or objective unit named in the case of the concrete number. In the evolution of number through the application of the fundamental operations to positive integers there have arisen such artificial numbers as the fraction, the irrational number, the negative number, the transcendental number, and the complex number. All these kinds of number may be found described in special articles.

Various classifications of numbers, some of which have become obsolete, date from the time of Pythagoras. Among those extant are *odd* and *even*, *prime* and *composite*, *rational* and *irrational*, and *figurate* numbers. The last classification grew out of the Greek tendency to associate numbers with geometric ideas. This notion may be illustrated by arranging groups of dots corresponding to the numbers 3, 6, 10, 15, as shown in the figures.









These forms, being triangular, suggest the propriety of calling the numbers 3, 6, 10, 15, *triangular* numbers. In the same way the numbers 4, 9, 16, 25, came to be called *square* numbers. Since other series of numbers can be made to correspond to pentagons, and still others to various other polygons, the general term *polygonal* numbers was applied to all numbers of this class. An arithmetical definition of polygonal numbers as old as Hypsicles reads, "If as many numbers as you please are set out at equal intervals from 1, and the interval is 1, their sum is a triangular number; if the interval is 2, a square; if 3, a pentagonal number; and generally the number of angles is greater by 2 than the interval." Spherical shot piled in the form of triangular pyramids or square pyramids or held in cubical boxes suggest numbers which were called *pyramidal* and *cubical*. For example, 4, 10, 20 are pyramidal numbers, and 8, 27, 64 are cubic numbers. The fact that some of these numbers correspond to figures of two dimensions and others to those of three dimensions also gave rise to the classifications *plane* and *solid*. The numbers in each of these groups belong to a series which has special properties and which is usually discussed in works on higher algebra under the title *Figurate or Polygonal Numbers*. Among the obsolete classifications are *amicable* (q.v.), *perfect*, *defective*, *redundant*, and *heteromecic* numbers. A perfect number is one which is equal to the sum of unity and the aliquot parts of the number; e.g., $6 = 1 + 2 + 3$. If the sum of the aliquot parts exceeds the number, it is called redundant; if it is less, defective. A heteromeric number is a number of the form $m(m+1)$.

Theory of Numbers. This is one of the most intricate and extensive branches of mathematics. It treats principally of the forms and properties of numbers. Thus, many indeterminate problems of the Diophantine type (see DIOPHANTINE ANALYSIS) belong to this subject; e.g., to find two numbers the sum of whose squares shall be a square number is a condition satisfied by 5 and 12, 8 and 15, 9 and 40, ... To find three square numbers in arithmetical progression is a condition satisfied by 1, 25, and 49, or by 4, 100, and 196. Various algebraic formulas serve to express all integers by assigning proper values to the letters involved. Thus, by giving to m the successive values 0, 1, 2, 3, ... $2m$ in any of the following groups of formulas: $2m$, $2m + 1$; $3m$, $3m + 1$, $3m + 2$; $4m$, $4m + 1$, $4m + 2$, $4m + 3$, the natural series of numbers results. This is evident since there is one number between every two consecutive even numbers, there are two numbers between every two consecutive multiples of three, three between every two consecutive multiples of four, and so on. By means of such formulas many properties of numbers may easily be exhibited. For example, the product of two consecutive numbers is divisible by 2. Let $2m$ be one of the numbers; then the other is either $2m + 1$ or $2m - 1$; the product, $2m(2m + 1)$, contains 2 as a factor, and hence is divisible by 2. The product of three consecutive numbers is divisible by 6. For, let $3m$ be one of the numbers (as in every triad of consecutive numbers one must be a multiple of 3), then the others are $3m - 2$ and $3m - 1$, or $3m - 1$ and $3m + 1$, or $3m + 1$ and $3m + 2$. Each of the three possible products, $3m(3m-2)(3m-1)$, or $3m(3m-1)(3m+1)$, or $3m(3m + 1)(3m + 2)$, is obviously divisible by 3; and as at least one of each pair of factors by which $3m$ is multiplied is an even number, the product must also be divisible by 2; but being divisible by 3 and by 2, it is divisible by 6. It may similarly be shown that, in general, the product of n consecutive integers is divisible by $1 \cdot 2 \cdot 3 \ldots . n$, called factorial n. These propositions form the basis of proof for many properties of numbers, such as: the difference of the squares of any two odd numbers is divisible by 8; the difference between a number and its cube is the product of three consecutive numbers, and is consequently always divisible by 6; any prime number which when divided by 4 leaves a remainder unity is the sum of two square numbers (thus, $41 = 25 + 16 = 5^2 + 4^2$, $233 = 169 + 64 = 13^2 + 8^2$, etc.). Besides these there are a great many interesting properties of numbers which do not come under any of the common classifications. Thus, the sum of the first n odd numbers equals n^2; e.g., $1 + 3 + 5 = 3^2$; $1 + 3 + 5 + 7 = 4^2$, etc.

History. No essential advance was made in the theory of numbers beyond the knowledge of the Greeks until the time of Vieta and Bachet (1612). The latter gave a satisfactory treatment of indeterminate equations of the first degree in his *Problèmes plaisants et délectables* (1612; 5th ed., 1884). Fermat (works published posthumously, 1670, 1679) enlarged the theory of primes and proved some of the most elegant properties of numbers. Legendre (1798), in his valuable *Essai sur la théorie des nombres*, epitomized all the results that had been published up to his time and contributed original and brilliant investigations, especially on the law of quadratic reciprocity. Euler had discovered this law empirically in 1783 and Legendre had announced it in general form in 1785. Gauss (1801) called this law the *Theorema Fundamentale in Doctrina de Residuis Quadratis*. It relates to the following property of two odd and unequal prime numbers: Let $\left(\frac{m}{n}\right)$ be the remainder which is left after dividing $m^{\frac{n-1}{2}}$ by n, and let $\left(\frac{n}{m}\right)$ be the remainder left after dividing $n^{\frac{m-1}{2}}$ by m. Whatever the prime numbers m and n may be, we always obtain $\left(\frac{n}{m}\right) = \left(\frac{m}{n}\right)$ in case the numbers are not both of the form $4x + 3$. But if both are of the form $4x + 3$, then we have $\left(\frac{n}{m}\right) = -\left(\frac{m}{n}\right)$. These two cases are comprised in the formula $\left(\frac{n}{m}\right) = (-1)^{\frac{m-1}{2}\cdot\frac{n-1}{2}}\left(\frac{m}{n}\right)$. Propositions embodying this law occupied the attention of Cauchy, Jacobi, Eisenstein, and Kummer. Up to 1897, 49 distinct demonstrations of the law of quadratic reciprocity had been published, making use of induction and reduction, of the partition of the perigon (see POLYGON), of the theory of functions, and of the theory of forms.

The *theory of primes* attracted many investigators during the nineteenth century, but the results were detailed rather than general. Tchebichev (1850) was the first to reach any valuable conclusions in the way of ascertaining the number of primes between two given limits, but the problem still remains unsolved. Riemann (1859) also gave a well-known formula for the limit of the number of primes not exceeding a given number. Other important investigations have been made with respect to such problems as that of determining a prime which shall exceed a given prime, and in particular, of determining the next larger one. Up to the present time this has not been solved, nor have we a convenient method of determining with certainty whether or not a given number is prime.

To Kummer is due the treatment of *ideal numbers*, a part of the general theory of complex numbers. They are defined as factors of prime numbers, and possess the property that there is always a power of these ideal numbers which gives a real number. For example, there exist for the prime number p no rational factors such that $p^3 = AB$, where A is different from p and p^2; but in the theory of numbers formed from the twenty-third roots of unity there are prime numbers p which satisfy the condition named above. In this case p is the product of two ideal numbers, of which the third powers are the real numbers A and B, so that $p^3 = AB$.

The *theory of congruences* may be said to start with Gauss's *Disquisitiones*. He introduced the symbolism $a \equiv b(\text{mod } c)$ and explored most of the field. Tchebichev published in 1847 a work upon the subject in Russian (Ger. trans., Berlin, 1889), and Serret did much towards making the theory known in France.

The *theory of forms* (see FORMS) has been developed by Gauss, Cauchy, Poinsot (1845), Lebesgues (1859, 1868), and notably Hermite. In the theory of ternary forms Eisenstein has been a leader, and to him and H. J. S. Smith (q.v.) is also due a noteworthy advance in the theory of forms in general. Smith gave a complete classification of ternary quadratic forms and extended Gauss's researches concerning real quadratic forms to complex forms. The investigations concerning the representation of numbers by the sum of 4, 5, 6, 7, 8 squares were advanced by Eisenstein, and the theory was completed by Smith.

The theory of *irrational numbers* (see IRRATIONAL NUMBER), practically untouched since the time of Euclid, received new treatment at the hands of Weierstrass, Heine, G. Cantor, and Dedekind (1872). Méray had taken in 1869 the same point of departure as Heine, but the theory is generally referred to the year 1872. Weierstrass's method has been completely set forth by Pincherle (1880), and Dedekind's has received additional prominence through the author's later work (1888), the recent indorsement by Tannery (1894), and, in America, by the translation of his work in 1901. Weierstrass, Cantor, and Heine base their theories on infinite series, while Dedekind founds his on the idea of a cut (*Schnitt*) in the system of real numbers, separating all rational numbers into two groups having certain characteristic properties. The subject has received later contributions at the hands of Weierstrass, Kronecker, and Méray.

The theory of *continued fractions* (due to Cataldi, 1613) was brought into prominence by Lagrange and further developed by Druckenmüller (1837), Kunze (1857), Lemke (1870), and Günther (1872). Ramus (1855) first connected the subject with determinants, to which phase Heine, Möbius, and Günther also contributed. Dirichlet also added to the general theory, as have numerous contributors to the applications of the subject.

Transcendental numbers were first distinguished from algebraic irrationals by Kronecker. Lambert proved (1761) that π (see CIRCLE) cannot be rational, and that e_n (e being the base of hyperbolic logarithms and n being rational) is irrational. Legendre (1794) showed that π is not the square root of a rational number. Liouville (1840) showed that neither e nor e^2 can be a root of an integral quadratic equation. But the existence of transcendental numbers was first established by Liouville (1844, 1851), the proof being subsequently displaced by G. Cantor's (1873). Hermite (1873) first proved e to be transcendental, and Lindemann (1882), starting from Hermite's conclusions, showed the same for π. Lindemann's proof was much simplified by Weierstrass (1885), still further by Hilbert (1893), and has finally been made elementary by Hurwitz and Gordon.

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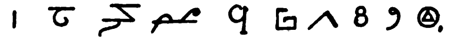
NUMBERS (Lat. *Numeri*, Gk. Ἀριθμοί, *Arithmoi*, Heb. *Bĕmidbār*, in the wilderness, the fourth word of the book), Book of. The fourth book of the Pentateuch. It consists of 36 chapters and receives its common name Numbers from the repeated references to the numbering of the people which it contains. The book in its present form falls naturally into three main sections: (*a*) i–x. 10; (*b*) x. 11–xix; (*c*) xx–xxxvi. The first section embraces: (1) the census of the people (i–ii); (2) series of ordinances for the priests and Levites (iii–iv), including general and specific duties, positions among the tribes, and census of Levites; (3) various laws—leper, marital jealousy, Nazarite (v–vi); (4) dedication of altar (vii); (5) miscellaneous ordinances with illustrative cases (viii–x.10). The second section contains: (1) the wanderings (x. 11–28); (2) revolts against Moses by the people, Aaron, and Miriam (xi–xii); (3) spies sent to Canaan (xiii–xiv); (4) various ordinances (xv); (5) rebellion of Korah with story of Aaron's selection (xvi–xvii); (6) ordinances for priests and people (xviii–xix). The third section embraces: (1) continuation of narrative of traditional history in the wilderness (xx–xxi); (2) story of Balaam (xxii–xxiv); (3) story of cult of Baal-peor (xxv); (4) second census (xxvi); (5) groups of ordinances with historical setting and illustrative cases (xxvii–xxxvi).

The Book of Numbers, like the other parts of the Pentateuch, furnishes an illustration of the method pursued by the Hebrew compilers in combining historical and legislative material so as to set forth and confirm the religious point of view of the later editors and the theory upon which they base their historical narrative, which carries the complete religious organization of Israel back to the days of Moses. See Pentateuch.

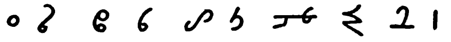
Bibliography. Besides the commentaries of Dillmann, Strack, Bennett, Baentsch, Holzinger, and Gray, and the introductions to the Old Testament by Driver, Cornill, Wildeboer, Kuenen, Kautzsch (rev. ed., London, 1910), Gautier, Steuernagel and Sellin (2d ed., Leipzig, 1913), consult: Westphal, *Les sources du Pentateuque* (Paris, 1888–92); Holzinger, *Einleitung in den Hexateuch* (Freiburg, 1893); W. E. Addis, *Documents of the Hexateuch* (London, 1898); Carpenter and Battersby, *The Hexateuch* (ib., 1900); Klostermann, *Der Pentateuch* (Leipzig, 1907); Merx, *Die Bücher Moses und Josua* (Leipzig, 1907).

NUMBFISH. A torpedo ray. See Torpedo.

NU'MERALS (Lat. *numeralis*, relating to number, from *numerus*, number). A system of figures or symbols to represent numbers; more particularly the Hindu-Arabic system, which employs the characters 0, 1, 2, ... 9, of which all, or sometimes the last nine, are called digits. Thus, we speak of writing the *numeral* for five, meaning 5. The word, however, is applied to other systems, as in speaking of the Roman numerals or the Greek numerals. Our common numerals come from old Hindu forms of uncertain origin. They appear in the tenth century in the form



being attributed to Boëthius (q.v.), but are probably due to some later writer. In substantially this form they are found in the time of Gerbert (see Sylvester II), written upon counters for use upon one kind of the abacus (q.v.) and bearing the name apices. This form is essentially that of the gobar or gubar (dust) numerals, possibly so called because they were written on the sanded board used in the Orient. These numerals appear among the Western Arabs of that period in the following form, written from right to left:



These numerals changed slowly from the time of their introduction into Europe, notably by Gerbert and Leonardo of Pisa (see Fibonacci), until they had assumed at the close of the fifteenth century, a form approximately like those known to us. Printed arithmetics then began to appear, and they acted as an obstacle to further changes. These numerals, inherited from the Arabs, have commonly been designated as Arabic, although in their origin they are Hindu. Since, however, they were not particularly usable until the introduction of the zero made possible a place value, and since about this time they became known to Arab writers and were transmitted by them to Europe, the credit may well be divided with the latter. The common numerals are well adapted to the decimal system, having exactly 10 symbols. The Roman numerals, on the contrary, while used with a decimal system of counting, were not well adapted to it and allowed for no simple place value. See Notation; Numeration.

NU'MERA'TION (Lat. *numeratio*, a counting, from *numerare*, to count, from *numerus*, number). The oral as opposed to the written expression of numbers. Numeration implies the naming of numerals (q.v.) and groups of numerals expressing numbers, the nomenclature thus employed having much to do with the efficiency of the system. Thus, if to every number there corresponded an independent name, a lifetime would not be sufficient in which to learn the numbers from one to a million. The common or decimal system proceeds by using independent names for a few of the smaller numbers and certain groups, and then repeats these names to express various numbers of groups. In this system the fundamental group is ten, independent names are given to the numbers, represented by 1, 2, ... 9, 10, 100, 1000, 1,000,000, and all intervening numbers are expressed by combining these names. In the evolution of language the names of a few numbers have lost their suggestiveness, but they are probably not exceptions to the regular system of formation, e.g., the etymologies of eleven and twelve suggest their original meaning to have been *one plus ten* and *two plus ten*.

In reading numbers it is convenient to separate the digits, beginning at the decimal point, into groups of three each. The groups of integers are then expressed by units, thousands, millions, billions, trillions, etc. Each group of integers includes three orders, viz., (1) the order of the group itself, (2) the tens of that order, and (3) the hundreds of that order. Similarly in each group of decimals the three orders are (1) the order of the group itself, (2) the hundredths of the order of the preceding group, and (3) the tenths of the order of the preceding group. Thus, e.g., the number 29,321.34567 is expressed:

Thousands	Units			Thousandths			Millionths		
thousands	hundreds	tens	unit	tenths	hundredths	thousandths	ten-thous.	hundred-thous.	millionths
29	3	2	1	3	4	5	6	7	0

Usage has not fully determined the names to be employed beyond hundred millions. The French and Americans call a thousand million a billion; the English and Germans use the word billion to designate a million million, and so on in groups of six figures. See NOTATION; NUMBER; NUMERALS.

NUMER′ICAL NOTATION. In modern music, a system used in theoretical works on music, of indicating single tones or entire chords by means of numerals. Every tone of a musical instrument can be denoted by a numerical sign indicating accurately its pitch. Middle C (the first note of the treble clef requiring a leger line *below* or the first note of the bass clef requiring a leger line *above*) is denoted by the small letter c with the number 1 placed on the right side above, c^1. The tones of the octave below this middle C are indicated by the *small* letters of the alphabet *without* any numbers, c, d, e, f, g, a, b; the next lower octave by the *capital* letters, C, D, E, F, G, A, B; the octave below this by capitals with the number 1 (either on the right side above or, better, on the left side below), $_1C$, $_1D$, $_1E$ or C^1, D^1, E^1, etc. The octave beginning with middle C adds the number 1 to the *small* letters, c^1, d^1, e^1, etc.; the next octave adds 2, c^2, d^2, e^2, etc.; the next 3, c^3, d^3, e^3, etc. This system of notation is especially used in indicating the range of various instruments. The range, therefore, of the piano can briefly be indicated as from $_1A$ to c^5. The pitch of the different strings of the violin is accurately indicated by g, d^1, a^1, e^2; of the cello by C, G, d, a.

Arabic figures are also used to indicate the fingering in compositions. For finger marking on the violin only four numbers are used, as the thumb is not used in playing that instrument. 1 refers to the index, 2 to the middle finger, etc. In marking the fingering of piano compositions the thumb is indicated by 1, the index by 2, the middle finger by 3, etc. The older system of marking the thumb by x and the other fingers as in violin music has fallen into complete disuse. For use of figures in figured bass notation, see FIGURED BASS.

In violin music the Roman numerals, I, II, III, IV represent the strings e, a, d, g respectively, but ordinarily Roman figures are employed to indicate chords. A large figure indicates a major, a small a minor, triad. The name of the key is placed before the figure, a capital letter to denote a major, a small letter to denote a minor key. Thus, A IV means the subdominant of A major (a major chord on the fourth degree of A); Cɪɪɪ, the minor triad on the third degree of C major; aV, the dominant of A minor (a major triad on the fifth degree). A diminished triad is marked by a small figure with a 0 on the upper right side; an augmented triad, by a prime (′). Thus, Dᴠɪɪ^0 means the diminished triad on the seventh degree of D major (c♯, e, g); fIII′, the augmented triad on the third degree of F minor (a♭, c, e). Chords of the seventh are indicated as the triads with an Arabic 7 on the lower right side; GV$_7$ means the chord of the dominant seventh in G (d, f♯, a, c); bᴠɪɪ$^0_7$, the chord of the diminished seventh in B minor (a♯, c♯, e, g). This system was introduced by the eminent theorist G. Weber, and is still generally used in modern textbooks. A new system, indicating not only the structure of the chord but at the same time its function, was first suggested by Arthur v. Oettingen in his *Harmoniesystem in dualer Entwickelung* (Dorpat, 1866) and completely elaborated by Hugo Riemann in his three treatises on harmony. Of these, *Vereinfachte Harmonielehre* appeared in an English translation by H. W. Bewerunge (London, 1895). See FIGURED BASS; HARMONY.

NUMID′IA (Lat., from *Numida*, Numidian, nomad, from Gk. *νομάς*, *nomas*, nomad, from *νέμειν*, *nemein*, to pasture, to distribute). Originally the Roman name for that part of northern Africa between the provinces of Africa Propria and Mauretania, corresponding nearly to the modern Algeria (Map: Rome, D 3). The inhabitants of Numidia, as of Mauretania, belonged to the race from which the modern Berbers are descended. They were a warlike race and excelled as horsemen, but were faithless and unscrupulous. In the great struggle between the Carthaginians and the Romans they at first fought on the side of the former, but subsequently the King of the eastern Numidians, Masinissa (q.v.), joined the Romans and rendered them effective service in the war with Hannibal. Favored by the conquerors, he united all Numidia under his sway. Of his successors in this kingdom, Jugurtha and Juba I are the most famous. After the victory of Cæsar over Juba in the African war, Numidia became a Roman province (46 B.C.) under the name of Africa Nova, but Augustus afterward gave the western part—from the river Ampsaga, now Wadi el Kebir—with Mauretania to Juba II, and the eastern part was united with Africa Vetus to form the new Province of Africa. The Emperor Septimius Severus erected Numidia once more into a province. It was conquered successively by the Vandals, the Byzantines, and the Arabs. Before the invasion of the Vandals, Numidia was a stronghold of African Christianity, and the jealousy between the Numidian bishops and the clergy of Carthage was one of the causes that brought about the Donatist schism. See Donatists.

NUMID'IAN CRANE. See Crane.

NUMIDIAN LANGUAGE. See African Languages.

NUMISMATIC (nū'mĭz-măt'ĭk) **AND ARCHÆOLOGICAL SOCIETY,** The American. An association organized in 1858. Its objects are the collection of coins and medals, the investigation of matters connected therewith, and the spreading of the science of numismatology. The society has a membership of 400, and its headquarters are in New York City, where it possesses a valuable collection and a good library of books on numismatics and archæology. In 1906 a building was erected for its exclusive use.

NUMISMATICS (from Lat. *numisma*, *nomisma*, from Gk. *νόμισμα*, coin, legal tender, from *νομίζειν*, *nomizein*, to use customarily, from *νόμος*, *nomos*, law, custom). The science which has for its object the study of coins and medals (see Medal) in their historical, artistic, iconographic, and economic aspects. In so far as it concerns ancient coins numismatics is a branch of archæology, but as in its broadest scope it includes the coins of *all* times and *all* peoples it is a distinct science, wider in its field than any of those branches of investigation—art, history, chronology, topography, antiquities, trades, skill in metal working, commerce—which it serves so well to elucidate and expand.

Nomenclature. The material of the study is the coin (a word derived through the Fr. *coin*, "a die," from the Lat. *cuneus*, "wedge"), which is, strictly speaking, a piece of *metal* stamped with a *legal impress* for *public circulation*. Isidorus (*Origines*, xvi, 17) well expresses this definition: "There are three essentials of a coin: metal, legal type, and weight. In the absence of any of these essentials it will not be a coin." In its strict application, then, numismatics should confine itself to the legal metallic currency of government, to the exclusion of all else. But there are many objects that bear so close a resemblance in form or in usage to actual coins that they are naturally and inevitably included in the study. Such are medals, struck in commemoration of an event or a person and not for circulation as money (see Medal); the ancient contorniates (see Contorniate), the use of which is not yet fully understood, though they may have served as checkers in the games; the obscene spintriæ; the so-called tesseræ, or cubes, of ivory, bone, or lead; and, later, siege pieces; jetons; hard times, tradesmen's, bank tokens, and paper currency, not to speak of such primitive mediums of exchange as the cowry shells of India and the wampum of the American Indians.

Numismatics has an exact terminology peculiar to its own needs. That side of the coin on which the face or main device is struck is called the obverse (Ger. *Hauptseite*, Fr. *droit* or *avers*, It. *diritto*), while the other side is known as the reverse (Ger. *Rückseite* or *Kehrseite*, Fr. *revers*, It. *rovescio*). The characteristic device on either side, whether portrait, figure, or scene, is called the type. In descriptions of the type the terms "to right," "to left" refer to the right and the left of the spectator. Besides the type there is often a small figure or adjunct (especially in ancient coins), as a mint mark or the like, which serves to identify the coin more closely. This is called a symbol. The principal inscription of either side, which may be circular in whole or in part, following the line of the rim, or in one or more lines across the surface, is called the legend. That part of either surface left unoccupied by type and legend is known as the field and is often occupied by symbols, letters, or monograms. The lower portion of the field, separated from the rest by a horizontal line, is the exergue. The term "flan" is applied to the disk or blank of metal ready to be coined, and hence to the coin itself regarded as a metallic disk. Thus, a coin is said to be struck on a broad or narrow flan. The diameter of the flan determines the module or measurement of the coin.

Three systems are in vogue for measuring coins: (*a*) the so-called Mionnet's scale, a purely arbitrary method based on circles of varying diameter, used mostly in the older works, and now obsolete; (*b*) by fractions of the inch—this is the recognized usage in England; (*c*) by millimeters. The last is the most scientific method and is in use on the continent of Europe and largely in the United States. The weight of coins is often a very important consideration, especially in determining the place from which ancient coins come. In England the weight is registered in troy grains. On the Continent, however, and largely in America it is given in grams.

Copper coins that have long lain in the ground, in connection with certain salts there existing, acquire a delicate surface oxidation, generally green, which is called patina and adds much to the beauty of the coin. Coins so oxidized are said to be patinated.

There are two ways of making coins: (*a*) by casting in molds, the more primitive method, afterward mostly confined to counterfeits; (*b*) by striking with dies. Even in the case of struck coins the flan is often prepared by casting. Consult here Percy Gardner, *Types of Greek Coins*, chap. iii (Cambridge, 1883); the article "Moneta," in William Smith, *A Dictionary of Greek and Roman Antiquities* (3d ed., London, 1890–91); Fowler and Wheeler, *Greek Archæology* (New York, 1909). In 1908, for the first time, a Greek die was figured and described; on this specimen, which came from Egypt, consult *The Year's Work in Classical Studies* for 1908, published by the Classical Association of England (London, 1909). The extraordinary rarity of Greek dies has been accounted for by the suggestion that the law enjoined that dies should be broken up, that they might not fall into bad hands.

Metals. The various metals used for coinage deserve a word of elucidation. (*a*) *Gold* was the standard metal of Asia Minor in the earliest times. It was rarely coined in Greece proper, but was largely minted by Alexander the Great and his immediate successors, by the Egyptian Ptolemies, in the Græco-Bactrian Empire, and at certain West Hellenic cities, as Syracuse in Sicily and Tarentum in Italy. The Romans first coined gold for the payment of their troops engaged in war against Hannibal in southern Italy (216–202 B.C.). During the Republican period, however, gold was coined only at irregular intervals and in limited quantities. But with Augustus and his successors there were enormous issues of gold currency until the third century, when it became rare until such coinage was renewed by Constantine and the later Roman and Byzantine emperors. Again, during the Dark Ages, in Europe gold fell into disuse as money. In modern times its use was once more revived, and gold is now the standard in most civilized countries.

(*b*) *Electrum*, a natural alloy of gold and silver in the proportion, roughly speaking, of 73 parts gold to 27 silver, found in the river beds of ancient Lydia in Asia Minor, was largely coined by the kings of that country and by the Grecian cities along the neighboring coast, especially Cyzicus and Phocæa. An artificially made electrum was used for coins at Carthage, at Syracuse, and by some of the Gallic chiefs. Electrum has the color of very pale gold, whence it was sometimes called white gold (λευκὸς χρυσός) by the Greeks.

(*c*) *Platinum* was coined extensively instead of gold in Russia from 1828 to 1846.

(*d*) *Silver* was the earliest, and always remained the standard, coinage of Greece. It was introduced into Rome in 268 B.C. and was universal in ancient, as it is in modern, times. During the Middle Ages it was the standard currency, but is now replaced as such by gold in most countries, being used only for subsidiary coinage.

(*e*) *Billon* is a name applied to certain base coins of ancient times having silver for a basis with a very heavy alloy of copper, tin, or lead. Such were the denarii and antoniniani substituted for silver at Rome from Caracalla (211 A.D.) to Diocletian (c.300 A.D.) and the base tetradrachms struck during the Roman Empire at Alexandria in Egypt, Antioch, and Cæsarea in Cappadocia. The latter are sometimes described as of potin, but see below, under (*g*).

(*f*) *Copper* was the original standard of value in Italy and remained the only coinage in Rome until the introduction of silver in 268 B.C., when it tended more and more to become a purely subsidiary coinage. In Greece the standard was, and always remained, silver, though here, as in the East, copper was earlier used for the smaller values. The Greeks derived their copper largely from Cyprus, whence its name, χαλκὸς κύπριος, *æs cyprium*, or simply *oyprium* or *cuprum*, from which our word "copper" is derived. The ancient coined copper had a strong alloy of tin; in other words, was really bronze. (See also below, under *Brass*.) Copper has since always been in common use for small change.

(*g*) *Potin* or pot metal bears the same relation in numismatics to copper as billon to silver. It is technically a mixture of bronze (i.e., copper + tin) and brass (i.e., copper + zinc), with slight traces, sometimes, of lead or of silver, and was used for money by the Gallic Sequani in the first century B.C. and by the mint of Alexandria in Egypt under the Roman Empire until 296 A.D. Modern numismatic works often erroneously describe the base tetradrachms of Alexandria, Antioch, and Cæsarea as being of potin instead of billon. See above, under (*e*).

(*h*) *Brass*, a mixture of copper and zinc, was found in nature and used for coinage under the early Roman Empire and in Asia Minor. It was regarded as more valuable than bronze and was called *orichalcum* (i.e., 'ορείχαλκον, mountain copper), often corrupted into *aurichalcum* (gold-copper), or χαλκὸς λευκός (white copper). In China brass has always been the ordinary medium of exchange.

(*i*) *Lead*, from its nature, was never well adapted to coinage, yet it was so used occasionally in ancient Gaul and Egypt. It has been a favorite material for counterfeiters at all times, and anciently even the official mints sometimes defrauded commerce by emissions of silver-plated lead coins instead of real silver. The majority, also, of ancient tesseræ are of lead. In modern times it is used only for trial pieces and for the cheaper class of medals.

(*j*) *Tin* has only occasionally been used for money, as by the kings of Numidia in the second century B.C. and, according to Aristotle, by Dionysius, Tyrant of Syracuse. In modern times it is found as money among the Chinese, Malays, and Senegambians.

(*k*) *Iron* as money was even rarer than tin in ancient times. We hear of iron coins among the early Lacedæmonians, in Byzantium, Argos, Arcadia, and elsewhere.

(*l*) *Nickel* was coined in northern India already in the third century B.C. Otherwise it was never used for money until modern times. Switzerland began to strike nickel pieces about 1850, and since then it has been coined in many countries.

(*m*) *Aluminium* has never served as money, but has frequently been used for medals. Consult the articles "Aes," "Argentum," "Aurum," "Electrum," in William Smith, *A Dictionary of Greek and Roman Antiquities* (3d ed., London, 1890).

History. There is no direct evidence that the ancients were collectors of coins as objects of art and curiosity, yet there can be no doubt that many such collections were made. We know that works of art of all kinds found eager collectors in classical times. We cannot but believe, therefore, that coins also were preserved for their antiquity and their beauty, the more so when we consider the wonderful artistic charm that so many, especially of the Greek series, possess. (See Friedländer, "Uber Münzsammlungen bei den Römern," in *Zeitschrift für Numismatik*, vol. iii, p. 167.) The fall of the Western Empire brought this, as all other manifestations of higher culture, to an abrupt termination.

The revival of classical studies led naturally to an interest in coins. Petrarch, who died in 1374, is said to have been the first modern collector; he sent his objects of art, including coins, as a present to the Emperor Charles IV. Many of the earliest commentators on the classical writers illustrated their notes with figures of coins. Here the knowledge of Roman coins naturally preceded that of the Greek. The first important works on coins did not appear until the sixteenth century. The Italian Andrea Fulvio published in 1517 his *Illustrium Imagines*, with portraits of famous men of ancient times taken from coins and gems. Such collections of coin portraits became very frequent in the next hundred years. Far more pretentious was the *Fasti Magistratuum et Triumphatorum Romanorum* of Hubert Goltz (or Goltzius), of Antwerp —a large folio published at Bruges in 1566; to this he added at intervals other works, as histories of Julius Cæsar and Augustus, illustrated by coins. Goltz was a man of learning, but without a high critical faculty and of so little scientific morality that he did not hesitate to invent at will coins that never existed; and in completing his *Fasti* he created consuls, generals, and private individuals who never lived.

Shortly after the appearance of Goltz's book Fulvio Orsini (Fulvius Ursinus), a member of the noble Italian family of that name, a man of profound learning, and a great collector of antiquities and coins, published at Rome in 1577 a series of Roman silver coins from his collection of the class commonly known as consular or family coins. Orsini was more careful than Goltz, but many false or wrongly described coins crept into his work without his knowledge. The book was reëdited in 1663 by the French numismatist Patin. The *Numismata Imperatorum Romanorum* of Adolph Occo was published at Antwerp in 1579. Goltz and Orsini had given their greatest attention to the coins of Republican Rome. Occo, on the contrary, devoted his work to those of the Empire. The book was scholarly for the period and collected a vast amount of material. It was reëdited twice at Vienna, in 1601 and 1625; then in 1683 it was entirely done over and published at Milan by Mezzabarba (Mediobarbus); and finally in 1730 a new edition was brought out by Argelati, forming an immense folio, in which the coins are described chronologically reign by reign and year by year. This was the first great attempt at a corpus of Roman Imperial coins.

During the seventeenth century we have no very notable additions to numismatic studies beyond the revisions of earlier works already mentioned. The works of the French savant Jean Tristan, viz., two separate books known as *Commentaires historiques*, published in several editions from 1635 to 1659, deserve mention, as well as the *De Re Nummaria* of Julius Cæsar Scaliger (1616), the *De Præstantia et Usu Numismatum Antiquorum* of Spanheim (1664), and a series of books on Roman and Greek coins by the explorer and collector Jean Vaillant. One important work belongs to the early eighteenth century, the *Thesaurus Morellianus*, published in 1734 from the manuscript of Andreas Morell by Sigebert Haverkamp, which remained for a long time a chief source of information regarding the Roman consular coins. This century saw the immense growth of the great national collections of Europe which have made possible the scientific study of coins. It was, in fact, the curator of the Vienna cabinet, J. H. Eckhel, who may with justice be called the Father of Numismatics, since his marvelous *Doctrina Numorum Veterum* (8 vols., Vienna, 1792–98) placed the study of ancient coins on a thoroughly scientific basis. He was a man of such extraordinary erudition, accuracy, and judgment that even now, more than a century after his death, his *Doctrina* is in every numismatic library and may be consulted with great profit, if used with discretion. For an account of the growth of numismatic studies, consult Babelon, *Traité des monnaies grecques et romaines*, vol. i, pp. 66–325 (Paris, 1901). For the current progress of numismatic studies, so far as they relate to Greek and Roman coins, consult *The Year's Work in Classical Studies*, published since 1906 by the Classical Association of England (London), and the articles "Archæology," and "Philology, Classical," in NEW INTERNATIONAL YEAR BOOK (New York, 1907 et seq.).

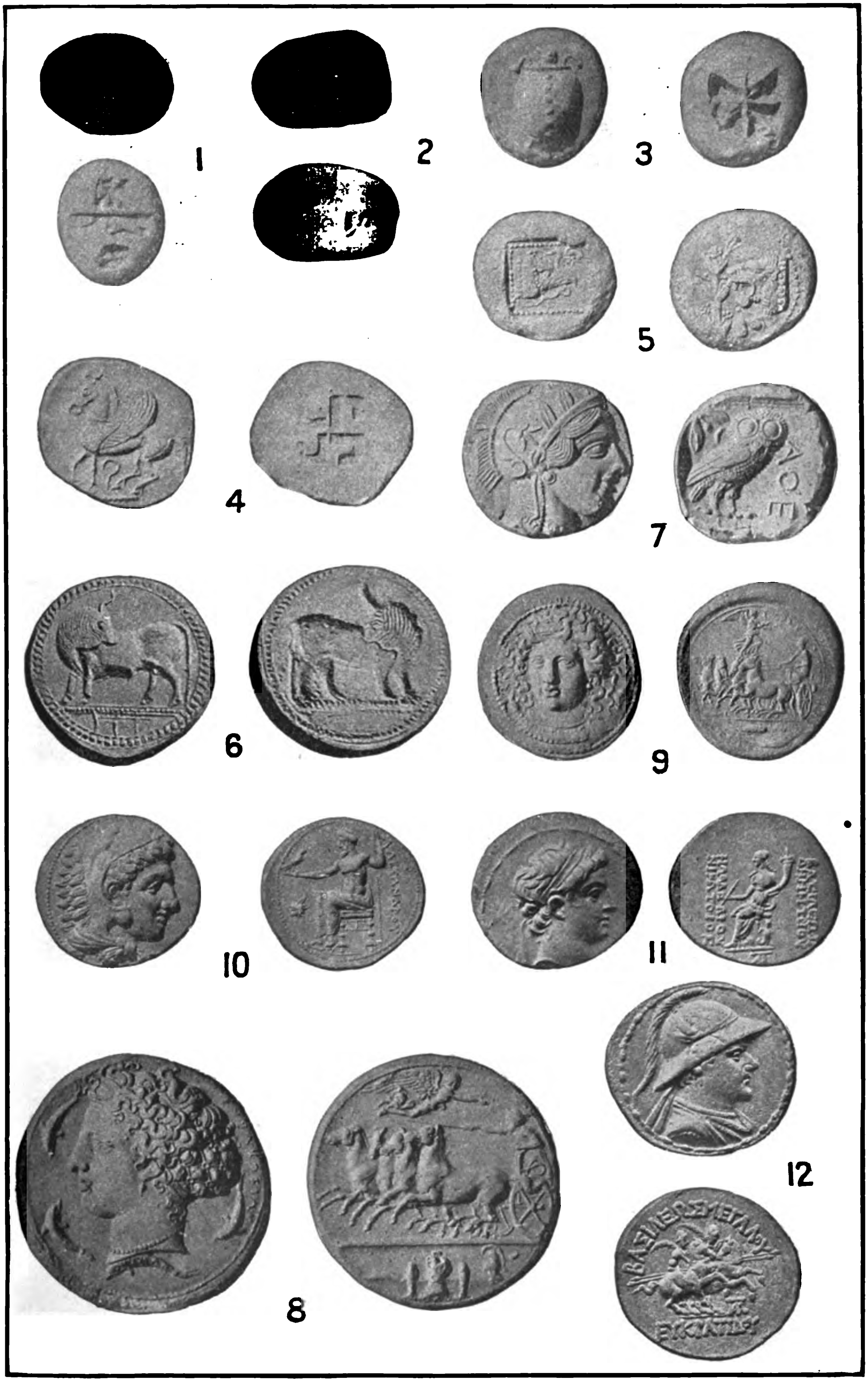
Ancient Coins. *Origin; Classification.*—Among the most primitive peoples some kind of trade or barter was known, and the precious metals were incontestably used as its medium for centuries before the invention of coinage. Excavations in Chaldæa, Babylonia, and Assyria have brought to light very abundant texts in which gold and silver are named as measures of value. In Genesis (xiii. 2, xxiv. 35) we are told that Abraham was "very rich in cattle, in silver, and in gold" and again (xxiii. 16) that he paid for the cave of Machpelah "four hundred shekels of silver, current with the merchant." In all transactions of this early period the metal was weighed, not counted in bars—an operation that appears not infrequently in the pictures on Egyptian tombs.

It was from the Babylonians that the weight systems passed by various trade routes to all the shores of the Mediterranean and, with the invention of coinage, were subdivided and adapted to the commercial needs of the Hellenic and Hellenized peoples. The Babylonians used a sexagesimal system; thus, as in measuring time, 60 seconds = 1 minute, 60 minutes = 1 hour, so, in measuring value, 60 shekels = 1 manah, 60 manahs = 1 kikkar. In the course of transmission from east to west this system became slightly modified, so that in Greece we find sums reckoned thus: 50 *στατῆρες* (or, locally, *σίγλοι*, = shekels) = 1 *μνᾶ* (i.e., *manah*), 60 *μναῖ* = 1 *τάλαντον* (corresponding to the kikkar). For fractions of the *στατήρ* (or unit) the Greeks developed a duodecimal system which became the basis of the Greek coinage and so passed to the early Romans, who, however, superposed upon it their own decimal notation. For a concise account of the transmission of ancient measures from Asia to Greece, consult B. V. Head, *Historia Numorum*, introduction (Oxford, 1887; 2d ed., 1912).

The first coins in the classical world were struck about 700 B.C. Ancient writers differ as to the place that should hold the honor of the invention, but it may be regarded as certain, however, that gold was first coined in Lydia and silver in Ægina; specimens of each of these primitive coinages are fairly common. From these early centres coinage spread with great rapidity to the Ionian coast cities and the islands in the Ægean Sea, as well as to all Greece and the Greek colonies in Sicily, Italy, and elsewhere. For a thorough examination of the origin of money, consult Babelon, *Les origines de la monnaie* (Paris, 1897), and the article "Geld," by K. Regling, in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912).

Ancient coins are classified in general according to the system laid out by Eckhel in his immortal *Doctrina*. The whole mass of material is divided into two general classes, Greek coins and Roman coins. The Greek series (or more properly non-Roman, since it includes also Bactrian, Jewish, Carthaginian, Ibero-Spanish, and Gaulish coins, etc.) is classified in geographical order about the basin of the Mediterranean as follows: (1) Spain, (2) Gaul, (3) Italy, (4) Sicily, (5) Macedon, Thrace, etc., (6) Greece,

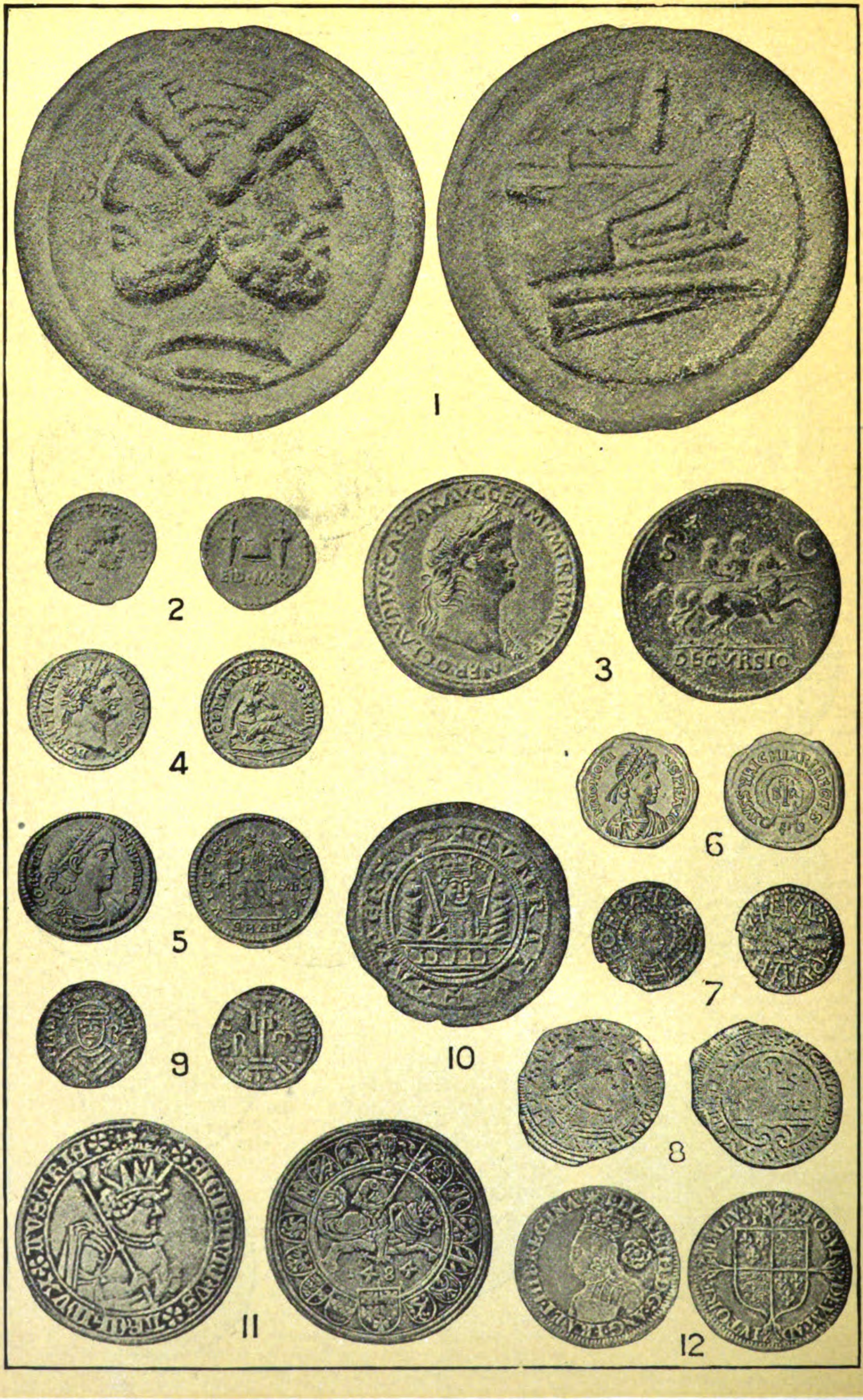
NUMISMATICS I.



1.	LYDIA,	PRIMITIVE GOLD STATER
2.	PHOCÆA,	GOLD STATER
3.	ÆGINA,	SILVER DIDRACHM
4.	CORINTH,	SILVER DIDRACHM
5.	CYRENE,	SILVER TETRADRACHM
6.	SYBARIS,	SILVER STATER (Incuse)
7.	ATHENS,	SILVER TETRADRACHM
8.	SYRACUSE,	SILVER DECADRACHM
9.	SYRACUSE,	SILVER TETRADRACHM
10.	ALEXANDER THE GREAT,	SILVER TETRADRACHM
11.	DEMETRIUS THE GREAT,	SILVER TETRADRACHM
12.	BACTRIA, EUCRATIDES,	SILVER TETRADRACHM

(Numbers 10, 11, and 12 are reduced in size)

NUMISMATICS II.



1. ROME, - EARLIEST LIBRAL AS
2. ROME, BRUTUS, - SILVER DENARIUS ('Ides of March')
3. ROME, NERO, - BRONZE SESTERTIUS
4. ROME, DOMITIAN, - SILVER DENARIUS
5. ROME, CONSTANTINE THE GREAT, - GOLD SOLIDUS
6. BYZANTINE, HONORIUS
7. ANGLO-SAXON, OFFA, KING OF MERCIA
8. FRANCE, DAGOBERT
9. POPE HADRIAN I.
10. CONRAD III., - BRACTEATE
11. AUSTRIA, SIGISMUND, - THALER
12. ENGLAND, ELIZABETH, - SIXPENCE

(7) Asia Minor, (8) the East, (9) Egypt, (10) the coast of Africa. Under these various heads the subdivision is alphabetical for cities and chronological for kingdoms. The coins of each mint are then treated in detail chronologically. By another division Greek coins are classed as (*a*) autonomous or struck by the city republics, (*b*) regal, (*c*) Greek Imperial, i.e., the Greek money of those towns which, under the Roman Empire, still retained the right of coinage for local circulation. Here, too, are generally added the Roman colonial coins, or coins with *Latin* inscriptions struck in a number of towns outside of Italy and Sicily, such as Corinth, Laodicea, and Antioch, in the East, and numerous colonies in Spain and Gaul. But the coins of the late Empire, from the Latin mints of Constantinople, Antioch, Alexandria, etc., are classified with the Roman series.

Roman coins are divided into two general classes: those of the Republic and those of the Empire. The former include the *æs grave*, or earliest heavy bronze coins, and the so-called consular or family coins (see below), with initials or names of magistrates. Properly these coins, too, should be classed chronologically; but as the dates of most are very uncertain, they are usually arranged alphabetically by families, as Aburia, Accoleia, Acilia, etc., and subdivided under the various names in order of supposed age. The Imperial series, from Augustus to Romulus Augustulus, is classed by reigns, under each of which the coins are arranged either chronologically or by the alphabetical order of the legend on the reverse. The same is true of the Byzantine series. On ancient coins in general, consult: J. H. Eckhel, *Doctrina Numorum Veterum* (8 vols., Vienna, 1792–98); T. E. Mionnet, *Description de medailles antiques grecques et romaines* (16 vols., with supplements, Paris, 1806–37); Grasse, *Handbuch der alten Numismatik* (Leipzig, 1853–54); François Lenormant, *La monnaie dans l'antiquité* (Paris, 1878–79); A. De Barthélemy, *Nouveau manuel de numismatique ancienne* (2 vols., Paris, 1890); G. F. Hill, *Handbook of Greek and Roman Coins* (London, 1899); Ernest Babelon, *Traité des monnaies grecques et romaines* (Paris, 1901); Theodor Reinach, *L'Histoire par les monnaies* (ib., 1902); George Macdonald, *Coin Types: Their Origin and Development* (Glasgow, 1905); G. F. Hill, *Historical Greek Coins* (London, 1906); id., *Historical Roman Coins* (ib., 1909); Fowler and Wheeler, *A Handbook of Greek Archæology* (New York, 1909); B. V. Head, *Historia Numorum* (2d ed., Oxford, 1911).

Greek Coins. The coins of the ancient Greeks deservedly occupy the first place in numismatic studies for their artistic excellence, which has never been surpassed, their enormous variety, and the light they throw on every phase of ancient Greek life. In the Hellenic world, especially in the earlier period, each town was a more or less independent state, and each proclaimed its autonomy by establishing a mint and issuing coins, generally for circulation within its own domains. The types chosen were extremely various, but generally bore some relation to the local cult. It will readily be seen, therefore, how much we are indebted to coins for our exact knowledge of the religion, mythology, art, and monuments of the ancient Greeks. This will be illustrated briefly in the following section, in which the history of Greek coins will be explained with reference to their types.

A short preliminary account of the various denominations, considered purely as money, will not be without value. In the early gold and electrum coinage of Asia Minor the unit was the *στατήρ*, *statĕr*, or standard, with its divisions the half stater (*ἡμιστατήρ*, *hēmistatĕr*), the third (*τρίτη*, *tritē*), the sixth (*ἕκτη*, *hektē*), and its multiple, the *διστάτηρον*, *distatĕron*, or double stater. From their place of emission or from the name of the reigning king the staters (*στατῆρες*) received such names as Κυζικηνοί, Λαμψακηνοί, Φοκαϊκοί (staters of Cyzicus, Lampsacus, Phocæa), Κροίσειος *στατήρ* (stater of Crœsus), Δαρεικὸς *στατήρ* or Δαρεικός (daric of King Darius), etc. The Persian silver coin was called *σίγλος* (*siglos*, silver daric), which is the Greek form of the Hebrew *sheqel* (shekel), which was a unit of count in Palestine until actually coined by Simon Maccabæus. In Greece the unit of count for silver coinage was the *δραχμή*, *drachmē* (see DRACHMA), which in its origin was probably the value in silver of the grain that could be placed (a handful, *δράξ*) upon one of the scales of the balance. Consequently the two equipoised handfuls or *δραχμαί* formed a new standard or unit of count, a *στατήρ* corresponding to the double drachme (*δίδραχμον* or silver stater). The Greek subdivision was duodecimal, as follows: the *στατήρ* or silver didrachm was divided into 12 *ὀβολοί* or obols, and for small change the obol itself was divided into portions known as *τριτητεταρτημόριον* (three-fourths portion, contracted to *τριτημόριον*, *tritēmorion*), *τριημιταρτημόριον*, (three-eighths portion), *τεταρτημόριον* (fourth portion, contracted to *ταρτημόριον*, *tartēmorion*), and *ἡμιταρτημόριον* (half-fourth portion or one-eighth obol). These names, with those of multiples of the drachma, were applied in different states to coins of interchangeable value in gold, silver, and copper, of which the following are the more important:

(*a*) Multiples of the drachma.—*Δωδεκάδραχμον*, *dōdekadrachmon*, a silver piece of 12 drachms, coined by the Ptolemies in Egypt and at Carthage. *Δεκάδραχμον*, *dekadrachmon*, of 10 drachms, coined in gold and silver at Athens, at Carthage, and in Egypt. The so-called silver medallions of Syracuse are *pentekontalitræ* (see below), equivalent to Attic dekadrachms. *'Οκτώδραχμον*, *oktōdrachmon*, of 8 drachms, coined in gold and in silver by the Ptolemies, in gold by the Seleucidæ, and in silver in Thrace and Carthage. *'Εξάδραχμον*, *hexadrachmon*, of 6 drachms, coined perhaps in gold by the Seleucidæ, certainly in silver at Carthage. *Πεντάδραχμον*, *pentadrachmon*, of 5 drachms, coined by the Ptolemies in gold and by the kings of Macedon in silver. *Τετράδραχμον*, *tetradrachmon*, in English *tetradrachm*, of 4 drachms, a silver coin of universal usage. *Τρίδραχμον*, *tridrachmon*, of 3 drachms, coined in silver at Ephesus, Carthage, Cyme, Alabanda, and elsewhere. *Δίδραχμον*, *didrachmon*, in English *didrachm*, the silver stater, in universal circulation, like the drachm itself.

(*b*) Divisions of the drachma.—*'Επτώβολον*, *heptōbolon*, of 7 obols (1⅙ drachms), the large copper coin of Egypt, struck under Ptolemy Philadelphus. *'Εξώβολον*, *hexōbolon*, a copper coin, of the second size, of Ptolemy Philadelphus. *Πεντώβολον*, *pentōbolon*, of 5 obols (⅚ drachm), struck in silver in Athens in the time of Aristophanes the comic writer and in copper of the third size in Egypt. *Τετρώβολον*, *tetrōbolon*, of 4 obols, a silver coin, struck at Athens in the fifth century B.C. Τριώβολον, *triōbolon*, of 3 obols, a gold coin in Egypt and Carthage; as a silver coin it equals the ἡμίδραχμον, hemidrachm, and is found everywhere. Διώβολον, *diōbolon*, of 2 obols, in silver everywhere, in bronze in Egypt. Τριημιώβολον, *trihēmiōbolon* (i.e., 1½ obols or ¼ drachm), in silver at Athens, Corinth, Leucas, Tegea, etc. Ὀβολός, *obolos*, the small unit, very common as a silver coin; in bronze in Egypt, at Chios, Metapontum, etc. Ἡμιωβόλιον, *hēmiōbolion* (1/12 drachm, ½ obol), also very common in silver. The smaller divisions are rarer. The *tritemorion* (¾ obol) is found in silver at Athens, Delphi, etc.; the *tartemorion* (¼ obol) at Athens and under Alexander the Great in silver, at Metapontum in copper; the *hemitartemorion* (⅛ obol) also at Athens in silver, at Metapontum in copper. In the Greek cities of Sicily and Italy the name νόμος or νοῦμμος was given to a silver coin of frequent mintage, similar to the Grecian didrachm or stater. But the Greeks of the West adopted also the native Sikel unit of the λίτρα, *litra*, equivalent to the ancient pound of copper, divided into 12 οὐγκίαι, *ougkiai*, or ounces, whence the Romans derived their earliest system of the *æs grave.* (See below.) On the litral system a number of fine silver coins were issued, as the splendid medallions of Syracuse, the most artistic coins ever struck, which are πεντηκοντάλιτρα, or pieces of 50 λίτραι, and the famous Δημαρήτεια of Queen Demarete; also δεκάλιτρα in Sicily, πεντάλιτρα at Agrigentum, and δίλιτρα at Rhegium.

To give an adequate description, even in general terms, of Greek coins as works of art and as historic documents would require a volume; the reader is referred for fuller information to the bibliography appended to this section. For convenience of classification and study the whole series is arranged in seven historic periods, as follows:

I. c.700–480 B.C. (Period of Archaic Art).
II. c.480–415 B.C. (Period of Transitional Art).
III. c.415–336 B.C. (Period of Finest Art).
IV. c.336–280 B.C. (Period of Later Fine Art).
V. c.280–146 B.C. (Period of the Decline of Art).
VI. c.146–27 B.C. (Period of Later Decline).
VII. c.27 B.C.–268 A.D. (Imperial Period).

First Period. *Archaic Art.*—This embraces all the coins struck from the beginning (about 700 B.C.) until the Persian War. Here belong the early gold and electrum coins of Asia Minor, of which the most primitive of all is the electrum stater of Lydia, attributed to the period of Gyges and Ardys (700–637 B.C.), which is without figures, the obverse having merely a series of sunken parallel lines or striations and the reverse a rough triple punch mark. From this beginning we find a gradual development in style and technique. The punch mark is long retained for the reverse, but it is gradually embellished, first by being divided geometrically, then by the addition of a small figure in relief within the sunken space. The types are generally animal figures or heads. Where the human head appears (for a divinity), the eye is shown in full, though the face be in profile, and the hair is represented by dots. The whole appearance of the figure is apt to be stiff and angular. In Magna Græcia (southern Italy) the punch mark is not found; instead the same type appears on both sides of the coin, in relief on the obverse, concave (or, as it is technically called, *incuse,* i.e., struck in) on the reverse. Inscriptions are either wholly lacking or limited to the first letters of a name.

Second Period. *Transitional Art.*—This extends roughly from the Persian War to the Athenian expedition against Syracuse (415 B.C.). The coins show a decided advance in style over those of the preceding period. The incuse square or punch mark is still often retained, but is much more regular and more frequently has a device in relief within. The figures are more accurate and varied, with greater attention to anatomical detail. Inscriptions are the rule instead of the exception, but are generally abbreviated, though sometimes names and even titles are written in full. The types are of infinite variety and often quite complex, but almost invariably drawn from the local mythology.

Third Period. *Finest Art* (to the accession of Alexander the Great, 336 B.C.).—The coins of this period, the finest that the world has yet produced, reflect the art of the greatest Greek sculptors. In fact, the die engravers often signed their names to their works of art, notably at Syracuse. The type, whether head, figure, or group, is in perfect proportion and exquisitely adapted to the limited space. The subjects are still drawn almost universally from mythology, though the splendid bigæ and quadrigæ of certain cities bear allusion often to victories in the national games.

Fourth Period. *Later Fine Art* (extending to the death of Lysimachus, King of Thrace, c.280 B.C.).—This period, corresponding to the art of Lysippus, illustrates the rise and perfection of portraiture. Alexander the Great himself hesitated to offend the religious susceptibilities of his subjects by substituting his own likeness for that of a divinity on his coins, which bear regularly the head of Zeus Ammon or Herakles or some other god. But his successors little by little introduced their own portraits, and we thus have in the succeeding periods a splendid series of wonderful likenesses of the rulers of the Greek world in the last three centuries before Christ, notably the Syrian Seleucidæ, the Ptolemies of Egypt, and the Macedonian and Bactrian monarchs.

Fifth Period. *Decline of Art* (to 146 B.C., the fall of Corinth and conquest of Greece by the Romans).—An age of magnificent portraiture; but as regards fabric the coins are broad and flat, with long inscriptions that mar the symmetry of the reverse type, which, too, displays always greater carelessness of details. Coins can now be more accurately dated; in fact, many bear the date and place of mintage in letters or monograms.

Sixth Period. *Later Decline of Art* (to the foundation of the Roman Empire, 27 B.C.).—This period signalizes the end of the distinctly Greek coinages. It is characterized by base silver coins, often with the fine portraits still, but crude in workmanship. The names of local magistrates are extremely common and of great historical value. The inartistic cistophori are in general circulation in Asia Minor. In the farther East the Bactrian money loses its Greek character and becomes Oriental.

Seventh Period. *The Greek World under Roman Sway.*—The Romans partitioned the Greek world into provinces, which were governed by agents sent out from Rome. But each town was allowed to retain its local mint and issue bronze coins, while the special privilege of issuing base silver (billon) tetradrachms was limited to

Antioch in Syria, Cæsarea in Cappadocia, and Alexandria in Egypt. These coins generally bear the head of the Roman Emperor, and a reverse type of local significance, in a very degraded style of art. The local mints were all closed under Gallienus (c.268 A.D.), with the exception of Alexandria alone, which retained its privilege until 296 A.D.

The standard work of reference on Greek coins is B. V. Head, *Historia Numorum* (Oxford, 1887; 2d ed., 1911). Consult also: id., *Guide to the Principal Gold and Silver Coins of the Ancients* (London, 1881); Percy Gardner, *Types of Greek Coins* (Cambridge, 1883); Friedrich Imhoof-Blumer, *Monnaies grecques* (Paris, 1883); British Museum, *Catalogue of Greek Coins* by different editors (12 vols., London, 1884–89); Imhoof-Blumer and Gardner, "Numismatic Commentary on Pausanias," in *Journal of Hellenic Studies*, vols. vi, vii (ib., 1885–86); W. Ridgeway, *Origin of Metallic Currency* (1892); Stanley Lane-Poole, *Coins and Medals* (3d ed., London, 1894); George Macdonald, *Greek Coins in the Hunterian Collection,. University of Glasgow* (Glasgow, 1899–1901); John Ward, *Greek Coins and their Parent Cities* (London, 1902); the article "Numismatik," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914). See also various periodicals: *Journal International d'Archéologie Numismatique* (Athens); *Nomisma* (Berlin); *Numismatic Chronicle* (London); *Revue Numismatique* (Paris); *Zeitschrift für Numismatik* (Berlin); *Rivista Italiana di Numismatica* (Milan); *Revue Belge de Numismatique* (Brussels); *Numismatische Zeitschrift* (Vienna). Though mentioned here, these periodicals will be found of value in the whole range of numismatic studies. In 1915 a monumental *Corpus Nummorum* was in process of publication at Berlin. Another similar publication, also in progress, was *Receuil général des monnaies grecques d'Asie Mineure* (Paris).

Roman Coins. The Italic peoples of central Italy were a pastoral race, and their earliest medium of exchange was cattle (*pecus*); the Latin words *pecunia* (money), *peculium* (property), and *peculatus* (stealing) are evidence of this. Bronze was the only medal that they possessed in quantity and used for implements, weapons, and ornaments; it thus furnished a convenient substitute for cattle in barter, and, in fact, for some centuries after the founding of Rome *æs rude*, or shapeless pieces of bronze, to be weighed with each transaction, were the only money. Thousands of these have been found, notably in sacred springs and in tombs, where they were thrown as votive offerings or deposited out of respect for the dead. The real coined money of the Romans began with the *æs grave*, or heavy bronze, about 350 B.C., though some have wished to place its origin as far back as the decemviral legislation (450 B.C.). The duodecimal system of the *æs grave* was adopted from the Greeks of southern Italy and Sicily, whose pound of copper, or λίτρα, of 12 ounces (οὐγκίαι) became the Roman *libra* of 12 *unciæ*. The libra thus became the unit of count (*as*) and as such was coined, a large and bulky copper (bronze) piece, which, however, seldom exceeds 10 ounces and is generally less. The earliest as and its divisions bear no letters whatever, but the value is marked by dots. The reverse type is always the prow of a ship. The obverse types of the various denominations differ as follows: *as*, double head of Janus with 1 (unit); *semis* (½ as = 6 unciæ), head of Jupiter with S; *triens* (⅓ as = 4 unciæ), head of Roma with four dots; *quadrans* (¼ as = 3 unciæ), head of Hercules with three dots; *sextans* (⅙ as = 2 unciæ), head of Mercury with two dots; *uncia* ($\frac{1}{12}$ as), head of Roma with one dot. These remained the fixed types of Roman bronze money during the whole Republic. All these coins are cast (not struck) and are of rude fabric. There is also an enormous series of *æs grave*, coined on the Roman system, but of even greater size, with the most diverse types, by the many Italic tribes of central and northern Italy.

But while the Romans at home were content to use their cumbersome bronze coins, their generals operating in Campania and Apulia struck coins on Greek systems, in silver as well as copper, and far finer in technique. These bear at first the name Romano, afterward Roma, and are known as Romano-Campanian coins. They were not intended for circulation in Rome. A great reorganization of Roman coinage took place in 269–268 B.C., after the successes over the Samnites, Pyrrhus, and the Tarentines. The bronze as and all of its divisions were reduced to one-third of their former weight and size (so that the as now contained only as much metal as the earlier triens), and at the same time multiples of the as were coined in silver; the silver coins along with the smaller divisions in bronze (sextans and uncia) were struck, the others still *cast*. The silver coins were the *denarius* ($\frac{1}{72}$ of a pound of silver, equivalent to 10 reduced asses), *quinarius* (of 5 asses), and *sestertius* (of 2½ asses). The silver coins have all the same types: obverse, head of Roma, with winged helmet, and sign X (= 10), V (= 5), IIS (= 2½) respectively; reverse, the Dioscuri galloping to the right, with the name Roma. Shortly afterward other reverse types were introduced, as Victory or Diana in a chariot. There was also a very slight emission of bronze multiples of the as, viz., the *decussis* (10 asses), *tripondius* (3 asses), *dupondius* (2 asses). But even now the bronze coinage, which was still the backbone of the Roman monetary system, tended gradually to diminish in weight. The as was reduced to the weight of the original quadrans, then to the sextans, and finally, in 217 B.C., under the pressure of the crisis produced by the invasion of Hannibal, the Lex Flaminia ordained a new reorganization of Roman finances. The as was reduced to the size of the original uncia and the denarius was coined at 84 to the libra of silver instead of 72. This changed the relation of silver and copper coins, and the denarius equaled 16 asses instead of 10. From henceforth all coins are *struck*.

The right of coinage, which at first was vested in the consuls and other magistrates, was now confined to a special board of *triumviri monetales* (though at first the board of moneyers was not limited to three), and these early began to place their initials, monograms, or names upon their coins. We thus have a long series of coins (the so-called family or consular series) bearing the most noble names in Roman history from the third century B.C. to Julius Cæsar, Pompey, Brutus, Cassius, and M. Antonius. About 150 B.C. the types begin to be very various on the silver coins, each moneyer following his own whim in recording family traditions, religious cults, or historical events. In 91 B.C. the great uprising broke out which is known as the Social War (q.v.). Many tribes of central Italy declared themselves independent of Rome and formed an offensive and defensive alliance against Rome, striking coins with the name of their leader, Q. Pompædius Silo, with the type of the bull of Italy crushing the serpent of Rome, and with the name of their new republic, Italia, in Oscan or Latin letters. It required some time for Rome to subdue this powerful union, and in 89 B.C. a financial crisis was again averted by the expedient of reducing the coinage. The silver was not changed, but the as was made equal to the *semuncia* (½ uncia). This is called the semuncial system. This was the last change under the Republic. Gold had not heretofore been regularly coined in Rome (though gold pieces of 20, 40, and 60 sesterces, with the legend Roma, had been struck after 217 B.C. in the Romano-Campanian series); in the last century of the Republic, however, there were numerous emissions of *denarii aurei* (or simply *aurei*), which, like the silver coins, bear the names of magistrates and generals, as Sulla, Pompey, and Cæsar. It was Julius Cæsar who first placed his portrait on a Roman coin.

The standard work on coins of Republican Rome is Ernest Babelon, *Description historique et chronologique des monnaies de la république romaine* (2 vols., Paris, 1885). With this compare Bahrfeldt, *Nachträge und Berichtigungen zur Münzkunde der römischen Republik* (Vienna, 1897, with supplementary volume, 1900). Consult also: Raffaele Garucci, *Le monete dell' Italia antica* (Rome, 1885); G. F. Hill, *A Handbook of Greek and Roman Coins* (London, 1899); Heinrich Willers, *Geschichte der römischen Kupferprägung vom Bundesgenossenkrieg bis auf Kaiser Claudius* (Leipzig, 1900); E. J. Haeberlin, *Systematik des altesten römischen Münzwesens* (Berlin, 1905); G. F. Hill, *Historical Roman Coins* (London, 1909); H. A. Grueber, *Roman Republican Coinages* (ib., 1910), a British Museum catalogue; also the works cited above at the close of the discussion of Greek coins, etc.

With Augustus Cæsar begins the coinage of the Empire, a long and important series with an infinite number of varieties in gold, silver, and bronze. Augustus took under his personal charge the coinage of gold and silver, leaving the bronze to the Senate; wherefore bronze coins from now till the third century bear the leletters S. C. (*senatus consulto*, by order of the Senate). The obverse of Imperial coins generally bears the ruler's head, with his name and titles; the reverse has a varying type (deity, personification, group, monument, or the like), with explanatory inscription or continuation of Imperial titles. The denominations are: in gold the *denarius aureus* (or simply *aureus*), equal to 25 silver denarii, and its half, the *quinarius aureus;* in silver the *denarius*, equal to 4 sestertii, and the *quinarius*, of 2 sestertii; in bronze the *sestertius* (so-called large bronze), of 4 asses, *dupondius*, of 2 asses (middle bronze), as (middle bronze), *semis* (half as, so-called small bronze), and *quadrans* (quarter as, also so-called small bronze). The sestertius and dupondius are of yellow bronze (orichalcum), the as of red bronze. Further, the dupondius and as, which are almost of a size, are generally distinguished by the fact that the former has the Imperial head with radiate or spiked crown, the latter with laurel wreath. Down through the Antonine period we have a splendid series both artistically and technically, but from the reign of Commodus (180–192) coins begin to be debased both in quality and fabric. The denarius especially began to be small and of base metal (Caracalla had introduced a new silver coin, the *antoninianus* or double denarius, distinguished by the radiate crown for emperors and a crescent at the neck for empresses). From this time all coins (except gold, which is rare) were more and more debased. Billon superseded silver or the denarius became a copper coin washed with silver. The larger bronze coins—sestertius, dupondius, as—disappeared forever. Under the later Empire mints were opened in all parts of the Roman world, and the sign of the mint appears on the coin, as PLON (*pecunia Londinensis*, mint of London), SMANT (*sacra moneta Antiochensis*, mint of Antioch), etc. Constantine (312 A.D.) fixed the gold unit at $\frac{1}{72}$ of a pound and named it *solidus*, with divisions the *semissis* or half and the *triens* or third. He reëstablished silver coins, notably the *miliarense* and the *siliqua*, and coined in bronze the *maiorina* and *centenionalis*. These coins endured till the fall of the Western Empire. The art of the Roman coins is best expressed by their portraiture. During the first two centuries the portraits are masterpieces; in the third century they are either gross or brutal; and in the fourth and fifth they are unnatural and absurd.

The reference work on Imperial coins is Cohen, *Description historique des monnaies frappées sous l'empire romain* (2d ed., Paris, 1880–92). Consult also: Stevenson, *Dictionary of Roman Coins* (London, 1889); Gnecchi, *Monete romane* (Milan, 1896); Blanchet, *Les monnaies romaines* (Paris, 1896).

Mediæval and Modern Coins. There is no sharp line of demarcation between ancient and modern coins, but the Byzantine series, which continues the mintages of the Eastern Roman Empire, is a natural link. Byzantine coins are: in gold the *solidus*, with its half and third; in silver the *siliqua*, with its half and quarter; in copper the small unit, without sign of value, the *nomisma* (marked ε = 5), *centenionalis* (marked I = 10), *denarius* (marked K = 20), and the *follis* (marked M = 40). The workmanship is generally crude. After the tenth century the portrait of the Emperor is supported by that of some patron saint. The reverse has such types as Victory with a cross, afterward a representation of the Saviour or the Virgin. Latin is gradually superseded by Greek in the inscriptions and wholly disappears by the time of Alexius I (1081–1118). The series continues until the overthrow of Constantinus XIV Palæologus by the Turks in 1453.

Consult Sabatier, *Monnaies byzantines* (2 vols., Paris, 1862), and Warwick Wroth, *Catalogue of the Imperial Byzantine Coins in the British Museum* (2 vols., London, 1908).

In the West the coins of the barbarian states founded on the ruins of the Roman Empire retained the form and style of the late Roman coins, though becoming always more degraded in art and fabric. Latin is the universal language. The principal coins in circulation in the early Middle Ages were the silver denarius and its half, the obol. It will be possible here to treat the development of coinage in modern times only in a very summary way. With the rise of barbarian kingdoms in Italy, Spain, and Africa we have coins in silver and copper (rarely gold) of the Ostrogoths, Visigoths, and Vandals. The Visigothic coinage in Spain extends from Leovigildus (573–586) to the overthrow of Roderic by the Arabs in 711. A Moorish coinage now begins in Spain, with the peculiarity of Arabic on one side and Latin on the other and bearing dates both according to the Hejira and according to the old Roman indictional system. These coins are numerous in the eighth century. Consult Francisco Codera y Zaidín, *Tratado de numismatica arábigo-española* (Madrid, 1879), and Oliver Codrington, *Manual of Musulman Numismatics* (London, 1904), containing a bibliography.

In England the Anglo-Saxon coinage begins in the seventh century, and, though also a development of the late Roman coins, it shows little resemblance to them. The two chief coins are the silver *skeatta* and the copper *styca*. The little gold coin of Pada, or Peada, King of Mercia (655–656), is notable as having runic letters along with the Latin. The coins of Offa, King of Mercia (757–796), and of Alfred the Great (871–901) are especially characteristic. The Merovingian kings in Gaul begin to strike coins under Theodebert I (534–538). There are gold solidi and trientes. A fine gold piece of Dagobert (622–638) is perhaps the best of the series. The Carolingian coins begin with Pepin (752–768) and are most common in the gold triens and silver denarius. Of Charlemagne (768–814) the coins are numerous and often have a good likeness. For Merovingian coins consult De Belfort, *Description générale des monnaies mérovingiennes* (Paris, 1892). For Carolingian coins, consult Gariel, *Les monnaies royales de France sous la race carolingienne* (Strassburg, 1883–85). In Italy the coinage of the Lombards begins during the Merovingian period in France, with numerous issues in Milan, Benevento, and Salerno, always with the flat flans and crude fabric of the period. For the coins of the early Middle Ages in Europe, consult Engel and Serrure, *Traité de numismatique* (Paris, 1892–95), and Arnold Luschin von Ebengreuth, *Allgemeine Münzkünde und Geldgeschichte* (Munich, 1904). Papal coins, a long and interesting series, begin with Hadrian I (772–785) and extend to Pius IX. Consult Cinagli, *Le monete dei Papi* (Ferino, 1848). The coins of the German rulers of this period often have on the reverse the name and emblems of a bishop. To the tenth century belongs the earliest coin with a German inscription, a denarius struck at Gittelde, near Brunswick, reading *hir steid te biscop* (*hier steht der Bischof*), with bishop's portrait and *Ielithis pening* (*Pfennig of Gittelde*). The word *pening* was now the general name in Germanic countries for denarius, whence English d. = *penny*. For mediæval German coins, consult H. P. Cappe, *Die Münzen der deutschen Kaiser und Könige des Mittelalters* (Dresden, 1848–57). In Norway and Sweden in the eleventh century we have denarii or pennies, with inscriptions in runic or Latin letters, and in Swedish or Latin, or both together. The coins of the Danish kings in England—Cnut, e.g.—have purely English legends, as do also those of contemporary Irish princes, as Sitric III, King of Dublin (989–1029). On the Continent in the twelfth and thirteenth centuries the denarii were struck on a broad flan, so thin that even with low relief it was impossible to stamp them on both sides. Such coins are known as *bracteates*, from Latin *bractea*, a thin, flat piece of metal, and were commonly struck by the German princes, of whom the first was Conrad III (1138–52). Those of Frederick Barbarossa are very numerous and often beautiful of their kind. Polish coinage begins with the introduction of Christianity under Miecislas I (c.965–992). The style and fabric are like those of German coins of the same epoch, but the inscription is often in Russian letters. Russian coins begin under Vladimir, who died in 1015. Consult Tolstoy, *La numismatique russe avant Pierre le Grand* (St. Petersburg, 1884). The coinages of the thirteenth century are notable for the large number of gold pieces. Here begins the splendid series of gold *florins* of Florence and *sequins* (or *ducats*) of Venice, which show an advance in style that rapidly spread to other parts of Europe. The doges' coins extend with little change from Giovanni Dandolo (1279–89) to Ludovico Manin (1797). For Italian coins, consult Promis, *Tavole sinottiche delle monete battute in Italia* (Turin, 1869). In the fourteenth century the coinage in gold and silver is vastly improved, the broad, flat pieces being very rich in ornamentation, especially the French silver *tournois* and gold *mouton*, the German silver *groschen*, and the English gold *noble* or *rose noble*. The fifteenth century continues the *gulden*, *florins*, and *ducats* of the previous epoch. The bracteates are still found, but are small and poor. A new type of money is now introduced at Joachimsthal in Bohemia, a broad, flat, silver coin, which quickly spread over all Germany and received from its first place of mintage the name *Joachimsthaler*, soon abbreviated to *thaler* (the origin of the American name *dollar*). The earliest dated thaler is that of Duke Sigismund of Tirol (1484). The broad thalers of the fifteenth and sixteenth centuries are real medallions of art, and this is true also of many of the contemporary coins of Italy, which are the work of artists of the first rank, as Francesco Francia of Bologna and Benvenuto Cellini. With the dating of coins the really modern period now begins; portraits are especially fine, and values are placed on the various pieces. The types are limited in variety, and the historic value of coins is largely transferred to medals. Oriental coins have an origin quite independent of the European series. In China some kind of coinage is said to have existed in the third millennium B.C. The earliest coins known are of brass and have the form of trousers, razors, or squares. A peculiarity of later Chinese brass coins (*cash*) is the square hole in the centre, for ease in carrying on strings. Consult: Terrien de Lacouperie and Poole, *Catalogue of Chinese Coins in the British Museum* (London, 1891). In Japan in the seventeenth century there were the oval gold *kobang* with mint stamps, the oblong gold and silver *itzebu*, and the oval brass *tempo*, the latter having the square hole for stringing, like the Chinese cash. Consult N. G. Munro, *Coins of Japan* (Yokohama, 1904). For the coinage of the United States, see MINT. See also COINAGE.

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Britain and Colonies (Manchester, 1876); W. S. Thorburn, *Guide to the Coins of Great Britain and Ireland* (London, 1884); R. L. Kenyon, *Gold Coins of England* (ib., 1884); R. S. Poole, *British Museum, Catalogue of English Coins* (ib., 1887); H. A. Grueber, *Handbook of Coins of Great Britain and Ireland* (1899). For Scotland: R. W. Cochran-Patrick, *Records of the Coinage of Scotland* (2 vols., Edinburgh, 1876); Robertson, *Handbook of the Coinage of Scotland* (London, 1878); E. Burns, *Coinage of Scotland* (1887); Richardson, *Handbook of the Scottish Coins in the National Museum* (Edinburgh, 1901). For Germany: Schulthess-Rechberg, *Thaler-Kabinett* (Vienna, 1840); Schwalbach, *Die neuesten deutschen Münzen unter Thalergrösse vor Einführung des Reichsgeldes* (Leipzig, 1879); F. von Schrotter, *Das preussische Münzwesen in 18ten Jahrhundert* (Berlin, 1902–04); K. Domanig, *Die deutsche Medaille* (Vienna, 1907). For France: Berry, *Etudes et recherches historiques sur les monnaies de France* (Paris, 1852–53); Hoffmann, *Les monnaies royales de France* (ib., 1878); Fernand Mazerolle, *Les Medailleurs français* (Paris, 1902–04). For Italy: Bazzi e Santoni, *Vademecum del raccoglitore di monete italiane* (Camerino, 1886); G. F. Hill, *Coins of Ancient Sicily* (London, 1903). For Portugal: Teixeira de Aragão, *Description des monnaies et médailles de l'histoire portugaise* (Paris, 1867). For Switzerland: Coraggioni, *Münzgeschichte der Schweiz* (Geneva, 1896). Among excellent manuals are: François Lenormant, *Monnaies et médailles* (Paris, 1883); Ambrosoli, *Manuale di numismatica* (Milan, 1895); Alfred von Sallet, *Münzen und Medaillen* (Berlin, 1898); Stückelberg, *Der Münzsammler* (Zurich, 1899). Collectors may find interest in H. N. Humphreys, *Coin Collector's Manual* (London, 1853); W. C. Prime, *Coins, Medals, and Seals* (New York, 1861); G. D. Mathews, *Coinages of the World* (ib., 1876); J. S. Dye, *Coin Encyclopædia* (Philadelphia, 1883); W. C. Hazlitt, *Coinages of the European Continent* (London, 1893); F. W. Burgess, *Chats on Old Coins* (New York, 1914).

NU′MITOR. See Romulus.

NUMMULITES, nŭm′mû-lī′tēz (Neo-Lat. *nummulus*, dim. of *nummus*, coin). A genus of vitreocalcareous foraminifera that secrete a lenticular shell composed of many whorls coiled in a flat spiral. At the present time *Nummulites* is represented by only a few species that live in the shallow water of warm seas, but during ancient geological times, especially during the Tertiary, it was of great importance, for its shells formed limestone formations often hundreds of feet in thickness. These massive nummulite limestones are prominent features in some parts of the Alps, and they occur also in the north of Africa, in Asia Minor, Persia, India, China, and Central America. An allied genus, *Orbitoides*, is common in the Eocene beds of the southern United States. See Foraminifera.

NUN. See Monasticism; Sisterhoods.

NUN. Egyptian deity. See Nû.

NUN BIRD. 1. A puff bird. 2. Any of several species of titmouse. 3. A variety of domestic pigeon. In each case the colors of the plumage suggest the name.

NUNC DIMIT′TIS (Lat., now lettest thou depart). The name given, from its opening words in the Latin version, to the canticle of Simeon (Luke ii. 29–32), which forms part of the compline office of the Roman breviary and in the evening service of the Anglican church follows the second lesson.

NUNCIO, nŭn′shĭ-ō. See Legate.

NUNC PRO TUNC (Lat. now for then) **JUDGMENT** or **ORDER.** In English and American law, a judgment, decree, or judicial order having a retroactive effect. Ordinarily a judgment takes effect when pronounced, but in cases where, after a verdict or a hearing on a motion, the court reserves its decision and any substantial reason appears (as, e.g., the death of a party to the suit in the meantime) why the judgment or order should be dated back so as to take effect from the time when it might have been rendered, it is the right and duty of the court to render the judgment or make the order *nunc pro tunc*. In general a judgment can be given such retroactive effect only where the delay in pronouncing or signing it was due to the act of the court, and not where it was the result of the laches or delay, however excusable, of the party prejudiced thereby.

However, in certain ex parte or noncontested proceedings, where there is no opposing party to be prejudiced by such action, an order may be granted *nunc pro tunc* in order to relieve the applicant from the consequences of excusable delay on his part. Thus, where a person is required to file a certificate or application at a certain time and, through ignorance or as the result of illness, he fails to do so, he may by order of the court be permitted to file it now (*nunc*) as of the date (*tunc*) when he should have done so. The right to enter a judgment *nunc pro tunc* existed at common law, but the procedure is now generally regulated by statute or by rules of court. See Decree; Judgment; Order.

NUNCUPATIVE (nŭn′kū-pa-tĭv) (LL. *nuncupativus*, nominal, oral, from Lat. *nuncupo*, to call by name, from *nomen*, name + *capio*, to take) **WILL.** An oral will or testament. Formerly all wills of personal property might be of this character, the modern requirement that they must be in writing being purely statutory. Wills of real property were not allowed before the Statute of Wills (32 Hen. VIII, c. 1), which permitted real estate to be devised under certain restrictions, but only in writing. To this rule there are no exceptions. Wills of personal property have also by various statutes (the Statute of Frauds and Statutes of Wills) been subjected to the same requirement, but to this rule exceptions are recognized in the case of mariners at sea and soldiers in actual military service, who may dispose of their personal estate by oral declarations made in the presence of witnesses. See Will.

NUNEATON (nŭn′ē′t'n) **AND CHILVERS COTON,** chĭl′vẽrz kŏ′ton. A manufacturing and market town and municipal borough in Warwickshire, England, on the Anker, 8 miles north of Coventry (Map: England, E 4). The town has the old Gothic church of St. Nicholas, the new church of St. Mary, embodying the remains of a twelfth-century priory of nuns, two endowed schools, a free library, and a literary institute. It owns water works and electric-light plants. It has noted ribbon manufactures, worsted, cotton, and elastic weaving industries, tool factories, brickkilns, ironworks, and tanneries. Coal is mined in the vicinity. In 1907 Nuneaton was incorporated. Pop., 1901, 24,996; 1911, 37,073.

NÚÑEZ, nōō′nyās, Rafael (1825–94). A

Colombian president, born in Cartagena. He entered politics as a member of Congress in 1851, served as Secretary of the Treasury in 1855–57 and 1861–62, and was Consul at Havre and Liverpool. A Conservative of progressive tendencies, he was elected President with the support of the Liberals in 1880. He alienated the support of the latter party by his acts, but the revolt started by them was suppressed (1881). During his administration Núñez secured a definitive settlement of the boundary with Costa Rica, endeavored to bring about a reunion of Colombia, Venezuela, and Ecuador, and took steps to increase the facilities for primary education. Reëlected in 1884, he became virtual dictator, oppressed the Liberals, and favored the Conservative-Clerical party. A formidable revolt broke out in 1885 under the leadership of Generals Reyes and Velez, but it failed, and in a few months peace was established, giving Núñez and the Conservatives complete control of the country. With a view to preventing further revolution Núñez carried out a reform of the constitution (1886), changing the government from a federalized to a centralized republic and extending the presidential term to six years. Núñez was elected President in 1886 and again in 1892. Internal peace was maintained, though the discontent of the Liberals was growing, and the death of Núñez, in 1894, was the signal for renewed disturbances in the country. Núñez published *La reforma política en Colombia* (Bogotá, 1885).

NÚÑEZ CABEZA DE VACA, nōō′nyȧth kä-bä′thȧ dȧ bä′kȧ, Alvar (c.1490–1557). A Spanish explorer, born in Jerez de la Frontera. He was living in Seville when Narváez was raising his forces for the colonization of Florida, and received the appointment of royal treasurer and high sheriff to the expedition. He shared in all the misfortunes of the undertaking, and was chiefly instrumental in extricating the party from the interior and getting it back to the Gulf coast. In the final wreck of the boats of the Narváez expedition Núñez was cast ashore with other survivors on one of the islands outside Matagorda Bay, Nov. 6, 1528. The Indians took charge of the survivors, and for some time the Spaniards lived on the islands and adjoining mainland in a state of semiservitude. Alvar Núñez secured freedom, and for several years wandered about the country in what is now Texas, trading among the different tribes and acting as physician or medicine man. Eventually Cabeza de Vaca, with Estévan Dorantes, Alonso del Castillo, and a Moorish negro named Estevanico, the only survivors of the wrecked boats of Narváez to return to civilization, started to find the route to the Spanish settlements. Making their way from tribe to tribe, across Texas to the Rio Grande, thence westward through Chihuahua and Sonora, they finally came upon a party of Spanish soldiers in Sinaloa, not far from the Gulf of California. They were sent on to the city of Mexico, where the Viceroy welcomed them on July 24, 1536. Cabeza de Vaca went back to Spain, where he arrived in August, 1537. He claimed some compensation for his years of suffering, asking for the governorship of Florida. Instead he was named adelantado (governor and captain general) of the provinces of Río de la Plata. Equipping an expedition, he sailed from Cadiz (November, 1540), reached Brazil the following March, arrived at Asunción after a remarkable experience in the tropical forests, and took possession of his province (March, 1542). Cabeza de Vaca became involved in difficulties with his subordinates, who revolted, put him under arrest (1543), and sent him back to Spain (1545). In 1551 the Council of Indies sentenced him to banishment in Africa for eight years, but the judgment seems never to have been carried out and he spent his remaining years in Seville. The accounts of his experiences in North and South America appeared as *Relación de los naufragios y comentarios*, together with other documents referring to Cabeza de Vaca, in the *Colección de libros y documentos referentes á la historia de América*, vols. v and vi (Madrid, 1906). An English translation by Buckingham Smith of the North American story is found in J. F. Jameson, *Original Narratives of Early American History*, vol. ii (New York, 1907), and in Fanny Bandelier, *Journey of Alvar Núñez Cabeza de Vaca* (ib., 1905). The South American account was translated by L. L. Dominguez for the Hakluyt Society Publications, vol. lxxxi (London, 1891). Consult: G. Fernández de Oviedo, *Historia general y natural de las Indias* (Madrid, 1853); H. H. Bancroft, *History of the North Mexican States and Texas* (San Francisco, 1884); Texas State Historical Association, *Quarterly*, vols. i, iii, iv, x (Austin, 1897–1907); W. Lowery, *Spanish Settlements within the Present Limits of the United States, 1513–1561* (New York, 1901).

NÚÑEZ DE ARCE, dȧ är′thȧ, Gaspar (1834–1903). A Spanish playwright, lyric poet, and statesman, born at Valladolid. Before he was 20 he was associated with the editorial staff of the Madrid journal *El Observador*. He gained considerable repute by his contributions to *La Iberia*, as correspondent for which he went through the African campaign (1859–60). He entered the Cortes in 1865, and after the troubles of 1868 he became civil governor of Barcelona. In 1882 he became Minister of Colonial Affairs under Sagasta. Núñez de Arce is of decided merit, both as a dramatist and as a lyric poet, and his verse enjoys widespread popularity in Spanish America as well as in Spain. In 1875 he published a collection of lyrics under the title of *Gritos del combate*, a title indicative of the passion and patriotic energy of most of them. After it he produced the *Idilio;* the *Elegía*, written, like the *Idilio*, in 1879; the *Ultima lamentación de Lord Byron* (1879); the *Vértigo* (1879), a graphic description of the crime and remorse of a modern Cain; the *Visión de Fray Martín* (1880); *La pesca* (1884); and *Maruja*. As a dramatist, he has written both alone and in collaboration with Antonio Hurtado. His individual works are the comedies, *Deudas de la honra*, *Quien debe paga*, and *Justicia providencial*, in all of which he cultivates the drama of manners, and the *Haz de leña*, a tragedy. This last piece deals with the story of Philip II and his son, Don Carlos. The editions of his lyrics are legion. That of *Gritos del combate* (Madrid, 1891) contains also his prose *Discurso sobre la poesía*. His chief plays are to be found in the *Obras dramáticas escogidas* (Madrid, 1879). Consult also the study of him by Marcelino Menéndez y Pelayo, in Novo y Colson, *Autores dramáticos contemporáneos*, vol. ii, reprinted in the critic's *Estudios de crítica literaria* (Madrid, 1884).

NÚÑEZ DE VILLAVICENCIO, vêl′yȧ-vê-thȧn′thyō, Pedro (1635–1700). A Spanish historical, portrait, and genre painter, born in Seville. He first studied under Murillo in Seville, and then, as he was a knight of the Order of St. John, went to Malta, where he was the pupil of Matteo Preti, called Il Calabrese. Upon his return to Seville he again studied with Murillo and continued to live with him. He assisted his master in founding the Academy of Seville and was his testamentary executor. His subjects were similar to those Murillo chose, and the works of the two men sometimes are confused. Thus, "St. John the Evangelist," in the Metropolitan Museum, New York, attributed to Murillo, is thought by some critics to be by Núñez. His "Children Playing with Dice" (in the Prado Museum, Madrid) shows considerable talent; and he was also a skillful portrait painter.

NÚÑEZ DE BALBOA, VASCO. See BALBOA, VASCO NÚÑEZ DE.

NUNIVAK, nōō′nĭ-văk. An island in Bering Sea, situated in lat. 60° N., long 166° W. (Map: Alaska, E 5). It has an area of about 1200 square miles. It is little known and is inhabited only by Eskimo.

NUN′NARI ROOT. See INDIAN SARSAPARILLA.

NUN OF KENMARE. See CUSACK, MARY FRANCES.

NUN OF KENT. See BARTON, ELIZABETH.

NUN'S PRIEST'S TALE, THE. One of Chaucer's *Canterbury Tales*. The source of the tale is a short fable by Marie de France, enlarged later into the old French "Roman de Renart," and a similar story is found in *Æsop's Fables*.

NURAGHE, nōō-ră′gȧ, or **NURHAG,** nōōr-hăg′. The name of ancient towers, in the shape of truncated cones, 3000 of which in greater or less state of preservation are scattered about the island of Sardinia. They are built of granite, limestone, basalt, porphyry, sandstone, and schist. Some of the stones in the lower courses are of great size; they have been roughly hewn and were laid up without cement. The entrances are small and low and the interiors are divided into two or three stories each with a dome-shaped ceiling. The upper chambers are reached by means of spiral staircases and are lighted through loopholes, and there is supposed to have been a terrace on the summit. They are to be compared with the talyots of Majorca and Minorca, the burgs or duns in the north of Scotland and in the Shetland Islands, and with the round towers of Ireland, both as to structure and function. Skeletons and deposits made with the dead have been found in them, but their original authors and purpose are not known. Consult: Petit Radel, *Nuraghes* (Paris, 1826–28); Spano, *Nuraghi di Sardegna* (Cagliari, 1867); James Fergusson, *History of Rude Stone Monuments* (London, 1872); Lambert, *Handbook to the Mediterranean* (ib., 1882).

NUR ED DIN EL BETRUJI, nōōr ĕd dēn′ ĕl be-trōō′jē. An Arabian astronomer of the twelfth century, born in Morocco, and also known by the name Alpetragius. He is mostly known for his opposition to the epicycle theory of Ptolemy, although he did not substitute anything better. His chief astronomical work was translated into Latin from Arabic by Michael Scotus in 1267. A Hebrew translation by Kalonymos bar David was rendered into Latin independently and published under the title *Alpetragii Arabis Planetarum Theorica Physicis Rationibus Probata* (Venice, 1531). Consult Suter, *Die Mathematiker und Astronomen der Araber* (Leipzig, 1900), and Huart, *Histoire des Arabes*, vol. ii (Paris, 1912).

NUREDDIN MAHMUD, nōō-rĕd-dēn′ mȧ-mōōd′, MALEK AL ADEL (1118–74). A Mohammedan ruler of Syria, born at Damascus. His father, Omad ed din Zengi, originally Governor of Mosul and Diarbekr on behalf of the Seljuk sultans, had established his independence and extended his authority over northern Syria, including Homs, Edessa, and Aleppo. Nureddin succeeded him about 1145 and changed the seat of government from Mosul to Aleppo. The feudal Latin states had been established in Syria as a result of the First Crusade, and Count Jocelyn, Prince of Edessa, tried to regain the territories which he had previously lost, but was signally defeated under the walls of Edessa. This was one of the chief occasions of the Second Crusade. Nureddin defeated the Crusaders before Damascus, and finally compelled them to abandon the enterprise. He next conquered Tripolis and Antioch, the prince of the latter territory being defeated and slain in a bloody conflict near Rugia (June 29, 1149), and before 1151 all the Christian strongholds in Syria were in his possession. An illness, which prostrated him in 1159, enabled the Christians to recover some of their lost territories, and Nureddin, in attempting their resubjection, was totally defeated near the Lake of Gennesaret by Baldwin III, King of Jerusalem; but he resumed the offensive, defeated the Christian princes of Tripolis and Antioch, making prisoners of both, and again invaded Palestine. Meanwhile he had obtained the sanction of the Caliph of Bagdad to his project to seize Egypt from the effeminate Fatimites and a large army under his lieutenant, Shirkoh, speedily overran Egypt. Shirkoh was succeeded by his nephew, the celebrated Saladin (q.v.), who completed the conquest of the country. Nureddin, becoming jealous of Saladin, was preparing to march into Egypt in person when he died at Damascus, May 15, 1174.

NUREMBERG, nū′rem-bĕrg (Ger. *Nürnberg*, nụrn′bĕrk). The second city of Bavaria, Germany, situated in Middle Franconia on the small river Pegnitz, a tributary of the Main, about 95 miles north-northwest of Munich (Map: Germany, D 4). It consists of the inner town (still partly walled, and divided by the river into the two parts Sebalderseite and Lorenzerseite, named after its two principal churches) and a number of suburbs, where the chief industrial establishments of the city are found. The river is crossed by 14 bridges. The inner town, with its red-roofed houses and gables facing the street, its numerous churches, and its architectural monuments, is of unusual interest, though most of the streets are narrow and crooked. No other large city in Germany has preserved its mediæval appearance to so remarkable a degree. Its fine samples of domestic architecture date mostly from the fifteenth and sixteenth centuries, the period of its fullest political and artistic development, when Dürer, Kraft, Vischer, Stoss, and others made it the centre of German art.

The church of St. Lawrence, the finest in the city, was originally built in the thirteenth and fourteenth centuries and was restored in the nineteenth century. It is Gothic in style, with beautiful stained-glass windows, and has an enormous stone ciborium, a masterpiece of Adam Kraft. St. Sebaldus is considered one of the finest Gothic churches of Germany. It was built in the fourteenth and fifteenth centuries and was recently restored. It contains some of the best samples of the work of Nuremberg artists, notably the tomb of St. Sebaldus by Peter Vischer, the Schreyer Monument by Adam Kraft, and the Last Judgment, over the southern entrance, by the same artist. Worthy of mention are also the church of Our Lady, with its fine portal, paintings by Wolgemuth, and its curious clock, the Gothic church of St. John, and the churches of St. Jacob and St. Ægidius.

Among the examples of secular architecture, the Kaiserschloss, called the Burg, deserves to be considered first, as the nucleus of the city. It was probably founded by Henry II. It was enlarged by Frederick Barbarossa, and is now used in its restored form as a royal residence. It is situated on a rock at the northern end of the old town and contains many objects of art. At the foot of the castle hill stands the town hall, built in Italian Renaissance in 1616–22 and restored in 1884–89. Its chambers are decorated with frescoes and paintings by Nuremberg artists.

Among the numerous old private houses of Nuremberg may be mentioned the Nassau house, a Gothic building of the fourteenth century, the houses of Dürer and Hans Sachs, and the Rupprecht house. The chief modern buildings are the theatre, the law courts, and the chamber of commerce. Many of the squares of Nuremberg are adorned with beautiful fountains and statues, of which the most noteworthy are the Schöne Brunnen, a Gothic pyramid (1385–96) covered with numerous statues, the statue of Dürer by Rauch, the Tugendbrunnen (1589), near the church of St. Lawrence, the statue of the poet Konrad Grübel, and the Kraft stations near St. John's Cemetery, consisting of a number of pillars adorned with reliefs by Kraft.

The National Germanic Museum, one of the largest in Germany, was founded at a congress of German antiquaries in 1852. In 1857 it was definitely located in its present site at Nuremberg, a former Carthusian monastery being purchased to house its collections. The neighboring priory of the Augustines has been restored and made a part of the museum, which now forms a picturesque feature in the mediæval quarter of the city. Valuable private art collections, like those of the city of Nuremberg, have been placed in custody of the museum. The collections are concerned with Germanic antiquities and are divided into over 30 groups. Among the most important are the collection of Christian and early mediæval antiquities; the gallery of paintings, especially rich in the early German school; the collection of sculptures, including the famous "Nuremberg Madonna," by Peter Vischer the Younger; the cabinet of engravings, containing over 200,000 specimens; collections of stained glass, seals, medals, etc. The library contains over 250,000 volumes; the archives possess a large collection of documents and autographs. The museum has issued many important illustrated publications, and has a quarterly journal, *Anzeiger des germanischen Nationalmuseums.*

The educational institutions comprise the old Gymnasium, whose foundation is ascribed to Melanchthon, the new Gymnasium, a number of special schools, the valuable library of over 110,000 volumes, the Bavarian Industrial Museum, with valuable collections, and the interesting municipal archives.

Nuremberg has long been one of the important industrial and commercial centres of Europe. Its wares, comprising chiefly toys, lead pencils, small articles of gold, silver, and ivory, gold leaf, watches, hardware, haberdashery, etc., are still the main products of the city, but there are also extensive machine works, chemical works, manufactures of ultramarine and other paints, railway cars, electrical supplies, lithographs, chromos, etc. The bronze foundry of Professor Lenz is noted for its artistic castings. The trade of Nuremberg, although of less relative importance than formerly, is still extensive. Besides trading in local manufactures, the city exports large quantities of hops and the small products of the house industry embraced in Nuremberg wares, and it imports groceries, grain, flour, etc. The trade is facilitated by strong financial institutions and good communication facilities.

The municipal affairs are administered by a first and a second burgomaster, a board of magistrates, and a municipal council. The municipality owns and operates a gas and an electric plant, the water works, and an abattoir. The city is equipped with electric railways. In 1818 Nuremberg had a population of 26,854. Latterly it has annexed a large number of adjacent communities, with the result that its population has increased from 99,519 in 1880 to 142,590 in 1890, 261,081 in 1900, 299,431 in 1905, and 333,142 in 1910. In 1900 the population of the inner town was 211,329. Of the total in 1905, 196,907 were Evangelicals, 86,939 Roman Catholics, and 6819 Jews.

History. Nuremberg is mentioned for the first time in 1050. Henry III conferred upon it the privileges of a mint, a market, and a customhouse, and Emperor Lothair granted it to Henry the Proud of Bavaria. Conrad III annexed it to the Empire and Frederick II raised it in 1219 to the rank of a free city of the Empire. Its importance increased with its political freedom, and it was the seat of the diet at which the Golden Bull of Charles IV was promulgated in 1356. The burgraves of Nuremberg (the counts of Zolre or Zollern since 1191; see HOHENZOLLERN) interfered but little with the affairs of the city.

Nuremberg became a very important factor in the trade between Italy and northern Europe, and its material prosperity found expression in that splendor which characterizes its private dwellings so well preserved to our day. The foremost centre of German art and one of the wealthiest cities of the Empire, Nuremberg also played a prominent part in the religious struggles in the period after the Reformation, which the city accepted in 1525. It was at Nuremberg that peace was for the first time concluded between Charles V and the Protestants in 1532, and it was also here that Charles V entered into a union with the Catholics against the Protestants in 1538. The commercial importance of the city, however, had already been dealt a serious blow by the discovery of the sea route to India in 1497.

The Thirty Years' War, during which Nuremberg was occupied by Gustavus Adolphus, who made vain efforts to dislodge Wallenstein from his intrenched position before the city (1632), and finally the wars of the French Revolution, completely exhausted the resources of the city republic, so that it offered itself to the King of Prussia in 1796 in order to be relieved of its enormous debt—an offer which was declined. The city was annexed to Bavaria in 1806. Nuremberg is noted for the many important inventions credited to its inhabitants, such as the watch, which was originally called the Nuremberg egg, the air gun, the gunlock, the terrestrial and celestial globes, etc.

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NURHAG. See NURAGHE.

NURSE FROG. A term applied to various frogs which take care of their young or eggs, or both, especially the midwife frog (q.v.).

NURS'ERY (from *nurse*, OF. *norice*, *nourice*, Fr. *nourrice*, nurse, from Lat. *nutrix*, nurse, from *nutrire*, to nourish; connected with Goth. *naups*, OHG. *nôt*, Ger. *Not*, AS. *něad*, *nyd*, Eng. *need*, OPruss. *nauti*, necessity). In horticultural parlance, a place where plants are propagated. In the New World the term is usually restricted to those establishments devoting themselves exclusively to the rearing of woody plants, while the rearing of herbaceous plants is classed as a department of floriculture. This division has been the natural result of the enormous demand for plants of both classes, and as one class requires a very different equipment from the other, the tendency towards specialization soon separated the two departments. A further differentiation is being made, a division along the line of fruit-bearing trees and plants and the ornamental or decorative trees and plants.

During the last decade the nursery business has changed in its method most markedly. The nurseryman who grows his own stock, other than peach stock, is the exception rather than the rule. Nearly all the pear and cherry stocks used in America are grown in France; while a great bulk of the apple stocks used in the United States are raised on the deep soils of the prairie by specialists in this line. Since the work of the modern fruit-tree nursery is to produce as large and straight a stock in as short a space of time as possible, and since the prevailing belief is that more than one crop of nursery stock cannot be successfully grown on any given piece of land, new soils are chosen for each crop of nursery stock. A nursery is, therefore, a transient affair, and the plants are usually grown on lands leased for short periods. Since the propagation of forest and ornamental trees seems to be less subject to the objection, viz., impoverishment of soil, urged against fruit trees, most of the nurseries engaged in this work are more permanent in their location. Comparatively few plants of this character are budded and grafted; most of the skill of the propagator is demanded in perpetuating species from seeds and cuttings.

The history of the nursery business in America began with its colonization. As early as 1768 Thomas Young, of New York, was awarded a prize of £10 for the largest number of apple trees, the number being 27,123. The great nursery interests of the country have from the first been located in western New York. The growth of the enterprise has kept pace with the demands made by the rapidly increasing commercial orchard and vineyard development. Statistics of the census of 1910 show that the total value of nursery products in 1909 was $21,050,822, of which 98 per cent was reported by 2470 special nursery establishments. The total acreage in nursery products was 80,618. The average value per acre increased from $170.17 in 1899 to $261.12 in 1909.

The influence of the leading nurseries on the horticulture of the country has been very marked. Previous to the development of the experiment stations their office was quite as much to test the merits as to propagate and disseminate a variety. The aim of all leading nurserymen has been to stimulate trade and maintain a high reputation through honest dealing and the dissemination of stock true to name. The sale of spurious stock has worked great injury by retarding development in localities naturally well suited to orcharding. These evils do not exist in developed orchard areas. New fruits introduced from abroad brought with them their natural enemies, the spread of which to other plants has led to the enactment of inspection laws in all States in which either the orchard or nursery business has attained an important place. These laws require the inspection of the orchards and nurseries for certain insect pests and fungus diseases, and prohibit the sale of infested stock, which must be destroyed. If the stock is free from the specified pests the nurseryman is granted a certificate to that effect, and it is taken as a passport in shipping from State to State. In 1912 the United States government passed a measure providing for a system of inspection and quarantine against the importation of serious plant diseases and insect pests on nursery stock and other plants and plant products.

NURSERY; DAY NURSERY; CRÈCHE (Fr., manger, or crib); INFANT ASYLUM. The crèche, or day nursery, was instituted in France by Marbeau, in 1844, to care for the infants of women who were obliged to work away from home during the day. In April, 1854, a charter was issued to the Nursery for the Children of Poor Women in the City of New York, "the particular business thereof to be the maintenance of and care of the children of wet nurses, and the daily charge of infants whose parents labor away from home." Children from six weeks to six years of age were admitted at a daily charge of 6 per cent of the mother's wages. This work grew rapidly and it was soon decided to provide for sick children also. Therefore, three years later, a new building was erected and the name changed to Nursery and Child's Hospital.

The work has extended until, in 1914, New York City had 96 nurseries caring for 5000 children daily at an annual cost of $400,000. The buildings are owned by the occupants in 45 instances and in the aggregate represent a property value of $1,500,000. Crèches were opened in Vienna in 1847, in Spain in 1855, in St. Petersburg in 1864. Temporary crèches have been opened in the country districts of France and Russia during the sowing and harvest seasons. Most large cities have a number of day nurseries, which, in Germany, Russia, and France, receive municipal aid, but which in America and elsewhere are supported by voluntary contributions. Twenty States grant pensions to widows with small children, but that does not take the place of the nursery with its many means of teaching and helping child and parent.

Cost. The cost ranges from 40 to 50 cents per person in the nursery, 8 to 14 cents being for diet. The parent pays 5 cents for each child per day in America; in London 3d. to 4d. In modern nurseries that are well managed there are attempts to determine the proper amounts of food needed per child per day. For example, a child one year old requires 1000 calories; a child two to five years old, 1500 calories; six to nine years, 2000 calories. About 15 per cent of this should be from proteid food, as the child requires a relatively large amount of building material as well as fuel for producing energy. Milk forms a large part of the dietary, because it contains the elements for tissue building and fuel besides the salts of lime and phosphorus so necessary to health.

Social Conditions. An analysis of 3450 New York families represented showed widows or widowers 20 per cent, deserted women 18 per cent, husbands incapacitated 12 per cent, and nearly 50 per cent of cases where both parents were irregularly employed.

Daily Routine. The children arrive between six and half past seven in the morning and remain until the same hours at night. They are inspected by the matron to see that there is no throat or skin lesion which would indicate infectious disease; then they leave their outer clothing to be hung in nets in the fresh air until night. They put on strong aprons if they are old enough to be classed as runabouts, or heavy sweaters or wraps if they are to play in the yard or upon the roof in cold weather. All children are required to take a nap in the middle of the day—the infants in cribs, but the older ones in slat racks constructed with compartments to hold a dozen and be turned up against the wall when not in use. Mattresses are not allowed. They have been ordered out with the common towel, hairbrush, and drinking cup.

Nearly all nurseries now have kindergartens, and many give meals and oversight to older children, who go to school, and return to finish the day. Many nurseries are in more or less close relation to settlements and social centres, and so develop nursery-extension work with classes in sewing and cooking for girls, dancing, games, Boy Scouts, literary clubs, etc. Mothers participate in many of these activities, so that the good influences extend beyond the child to the family and neighborhood. The Ida Heckmann Crèche, in Berlin, and some others maintain a training school for nursemaids. The Association of Day Nurseries of New York City was organized in 1897. The Federation of Day Nurseries (national) was organized in Chicago in 1898. The British National Society of Day Nurseries was founded in 1901 and in 1914 embraced 60 nurseries. Consult J. B. F. Marbeau, *Des Crèches* (Paris, 1845), and the *Reports* of The Federation of Day Nurseries, published biennially in New York City.

NURSERY LORE. The folklore of children. The material may be separated into two classes, according as it consists of traditional sayings and usages which have been handed down by mothers and nurses or of customs maintained and transmitted by the children themselves. To the former class belong those nursery rhymes and jingles which are ascribed to Mother Goose, a name adapted from the French. In 1697 Charles Perrault issued a few tales, popular in origin but of literary ornamentation, which he called *Contes de ma mère l'oye*. This designation was not invented by Perrault, for the goose had long had a popular repute as a story-teller. About 1760 J. Newbery, the first publisher of books for children, produced a little collection of rhymes to which he gave the name of *Mother Goose's Melody*. In 1810 J. Ritson brought out *Gammer Burton's Garland, or the Nursery Parnassus*, in which he included some rhymes not given by Newbery. Between 1824 and 1827 Munroe and Francis, Boston, Mass., issued an expanded edition under the title of *Mother Goose's Quarto, or Melodies Complete*, reprinted in 1833 as *Mother Goose's Melodies*, and the popularity of this publication may have something to do with the widespread acceptance of the name. Up to this time nursery rhymes were not learned from books, but repeated by word of mouth; it seems likely that the traditional stock was similar to that which has found a place in print.

More curious, from the point of view of folklore, are the games played by children, often to the accompaniment of rhymed formulas. These are for the most part of ancient origin, and although at the present time extinct or moribund, have been traditionally current for centuries. Allowing for minor variations, American game rhymes are very similar to those of Great Britain, France, and Germany. Such correspondence, formerly interpreted to signify a remote common descent, is now known to be the result of intercommunication. The games and the formulas used in playing them were not originally the property of children, but indifferently employed by both old and young. These customs did not owe their origin to peasants; on the contrary, they were introduced and supported by the higher strata of society. Of the games some have a religious character, or at least were formerly interpreted as possessing religious significance; e.g., a sport called Weighing, in which a player is carried by two others, each of whom grasps with right hand the left hand of his fellow, constitutes an imitation of the Last Judgment, in which the soul is to be weighed to determine its destination for heaven or hell. The game of London Bridge, in which the line of participants is made to pass under an arch formed by the lifted hands of two keepers, has been supposed to have had its source in imitation of foundation sacrifices, in which a human being was interred under the bridge in order to insure its stability. A drama enacted by girls, called Old Witch, sets forth the robbery of children by a limping cannibal demon, the devouring of the victims, and their resuscitation by the mother; the witch who figures in this amusement is of the same class as the destroyer of children known to the ancient Greeks as Lamia or Empusa. The well-known childish dance in which is imitated the sowing of oats, etc., may go back to a rite intended to insure the ripening of the crops. Guessing games, in which the object is to win the counters of the adversary, seem analogous to those played in the time of Xenophon, while that in which the opponent is required to guess the number of fingers which may be held up is similar to one depicted on Egyptian pyramids.

Bibliography. J. O. Halliwell-Phillipps, *The Nursery Rhymes of England* (London, 1842); W. H. Whitmore, *The Original Mother Goose's Melody*, reproduction in facsimile (Boston, 1892); Gomme, *Traditional British Games* (London, 1894); H. C. Bolton, *Counting-out Rhymes of Children* (Boston, 1897); A. C. Haddon, *The Study of Man* (New York, 1898); W. W. Newell, *Games and Songs of American Children* (2d ed., Boston, 1903); R. V. Halsey, *Forgotten Books of the American Nursery* (ib., 1911).

NURSERY RHYMES. Children's rhymes, used in the nursery and in childish games. These songs and sayings, witty or absurd, are peculiar to the English language, and for the most part of no great antiquity, the majority scarcely antedating the seventeenth century. It has been thought that some may have had at first a political significance, but many doubtless owed their origin to the infantile love of nonsense for its own sake. Certain rhymes of nurses, such as those used to amuse children in the process of dressing, may have a more respectable antiquity. A word may be added about the formulas known as counting-out rhymes in games. One word is told off for each player, and he on whom falls the final syllable is dropped from the row; this process of exclusion is continued until only one remains, who is "it." All modern nations possess similar rhymes, which have the common property of being unintelligible. It has been supposed that the rhymes were invented for purposes of sorcery or sacrifice, and have become degraded in their survival; yet it is uncertain whether we are to look for any deeper motive than a childish fondness for mystery and nonsense. See NURSERY LORE.

NURSES, TRAINING OF. At the end of the fourth century, when the temples of Æsculapius, Hygeia, and Serapis were closed, the sick poor formerly housed in these temples were turned adrift. Christian monasteries and temples were opened to them, and conventual orders arose whose office was to provide for the sick. In very early times there was a corporation of matrons and elderly women in England who were employed in obstetrics, at that time forbidden to men. The eleventh century saw the beginning of the founding of hospitals, many of which were rendered necessary by the Crusades. The hospitalers were assisted by various bodies of women, in the dearth of physicians. In the latter part of the twelfth century Hildegarde, Abbess of Rupertsberg, organized a school of nurses for service in the hospitals. From these beginnings grew the modern system of training nurses for charitable hospital work, for charitable work among the sick poor in their homes, and later for assistance to the sick rich for proper remuneration. In 1840 Mrs. Fry's nursing sisters composed an organization which cared for the outcasts of London society. Florence Nightingale (q.v.) gave the greatest impetus to the movement towards securing efficient training for nurses, after her return to London in 1853, upon the completion of an inspection of hospitals all over Europe. In 1872 the Bellevue Training School, New York City, sent out the first class of trained nurses graduated in the United States.

The course of study for nurses under training has become lengthened during the past 10 years, and the tendency has been towards State regulation of trained nurses. Different States provide for varying periods of training, nurses being allowed to register on the completion of their term, generally without examination. Two years is the minimum length of training required, but most States require three. Many of the laws specify that training shall be received in a general hospital; others credit the time spent in taking special courses towards the total. There have lately also sprung into existence in several States a number of correspondence schools whose special claim is to produce in a period of about six months an efficient nurse willing to work for a smaller consideration and thus meet the need of the average wage earner. Two new provisions are gradually coming into the laws of later date. One is for the inspection and registration of training schools and giving them a place among educational institutions, the other providing for a more exact definition of what constitutes a trained nurse, the disposition being to restrict the title to the trained graduate professional woman. An applicant is received into the school for a period of two months on probation. During this period applicants receive their board and lodging at the training school without charge, and serve without remuneration, and their education, physical strength, endurance, adaptability, powers of observation, and judgment are tested. Should they prove acceptable they are required to sign an agreement for the remainder of the term of training, to obey regulations and to remain in the school till the term has ended. Pupils reside in the hospital or in the training-school building and assist in various departments. No charge is made for instruction. The pupils receive board, lodging, and laundering of clothing, and a small amount of money for the purchase of textbooks and uniforms and for incidental expenses. The instruction is given by the physicians and surgeons of the hospital, the superintendent, and the head nurses, and covers anatomy and physiology and all departments of nursing, including cooking of proper food and delicacies, and frequently massage, obstetrics, and the care of insane as well as alcoholic patients. In some institutions nurses are sent to families before graduating, as a test. In 1906 the position of Woman Inspector of Nurses' Training Schools was created in New York State. In 1907 a nurses' training school with a three years' course was established in Paris.

Among the more prominent training schools in the United States are the following: Bellevue, Presbyterian Hospital, New York Hospital, and Mount Sinai Hospital, in New York City; Massachusetts General Hospital, in Boston; Philadelphia Hospital and Pennsylvania Hospital, in Philadelphia; Johns Hopkins Hospital, in Baltimore; and Illinois Training School, Chicago. Consult: Florence Nightingale, *Notes on Nursing* (new ed., New York, 1883); Hodson, *How to Become a Trained Nurse* (New York, 1905); Nutting and Dock, *History of Nursing* (2 vols., ib., 1907); *Florence Nightingale to her Nurses: Selections from Addresses* (London, 1914). For a full text of laws (with summary) in the different States governing the registration of nurses, see L. C. Boyd, *State Registration for Trained Nurses* (2d ed., Philadelphia, 1915).

NURSE SHARK. 1. A shark (*Ginglymostoma cirratum*), the type of a family, which abounds in the waters of the West Indies and on the west coast of Mexico, where it is called gata. It is from 6 to 10 feet in length and is brownish in color, with an obtuse depressed head and rounded fins. See Plate of GREAT SHARKS, with the article SHARK. 2. In New England, the sleeper (*Somniosus microcephalus*). See SLEEPER SHARK. 3. The Port Jackson shark. See CESTRACIONT.

NURSING. See INFANTS, FEEDING OF; NURSES, TRAINING OF.

NUS, nụs, EUGÈNE (1816–94). A French dramatist, born at Chalon-sur-Saône. His first dramatic success was *Jacques le corsaire* (1844), and his other plays include: *L'enseignement mutuel* (1846), with Desnoyer; *Le vicaire de Wakefield* (1849), with Tesserand; *La tour de Londres* (1855), with Brot and Lemaître. He was also prominent as a Socialist and was at the head of the *Bulletin du Mouvement Social* in 1873. His writings include: *Les dogmes nouveaux* (1861), poems; *La république naturaliste: Lettre à Emile Zola* (1879); *Choses de l'autre monde* (1880); *A la recherche des destinées* (1891); *Vivisection du catholicisme* (1894).

NUSHAGAK (nōō'shȧ-gȧk') **BAY.** The northernmost extension of Bristol Bay, Alaska (Map: Alaska, G 6). On it are the native settlements of Chogiung, Kanakanak, and Nushagak, all with government schools. The bay is noted for its salmon fisheries, the catch varying from 2,800,000 in 1910 to 6,100,000 in 1908. The spawning grounds of the tributary streams, Nushagak and Wood (q.v.) rivers, have been protected by government closing since 1907.

NUSKLALA. See CLALLAM.

NUSKU, nōōs'kōō. A Babylonian and Assyrian deity, probably of Sumerian origin. As he seems to have been a personification of the sickle of the new moon, he was probably at first a lunar god, then he became a light or fire god. He has a place in the pantheon of Nippur as the representative of Ellil, but he is also connected with Harran as son of Sin, the moon god. He was regarded as the messenger of the gods, fire being the medium of intercourse with deity (cf. Agni in the Indian theology), but in this aspect he was inferior to the far better known Nabu. Nusku, along with Girru, appears especially in the incantation texts, where, according to universal arts of witchcraft, fire is used to destroy symbolic representations of an enemy and so is supposed to affect the latter's person. In this connection Nusku had a wide vogue in the vulgar religion. As the god of fire he was also honored as a patron deity of civilization. Consult: Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); id., *Die Religion Babyloniens und Assyriens* (Giessen, 1902–12); Zimmern, in Eberhard Schrader, *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); id., in Hastings, *Encyclopædia of Religion and Ethics* (Edinburgh, 1909); P. Dhorme, *La religion assyro-babylonienne* (Paris, 1910).

NUSLE, nōōs'lyĕ. A town in the Crownland of Bohemia, Austria, situated a few miles southeast of Prague, in a wine-growing region. The town has a castle and a park. Its productions are candles, soap, and coco-fibre mats. Pop., including the adjacent village of Pankratz, 1910 (arrondissement), 52,817.

NUSSBAUM, nụs'boum', JOHANN NEPOMUK VON (1829–90). A German surgeon. Born and educated in Munich (M.D., 1853), he took postgraduate courses in Paris, Würzburg, and Berlin, and became privatdocent at Munich in 1857. From 1860 until his death he held the chair of surgery, during the wars of 1866 and 1870–71 serving also as consulting surgeon-general of the Bavarian army. In his time he was among the best-known German surgeons, one of the first to introduce Lister's theory into Germany, a famous teacher, and an operator who performed more than 600 ovariotomies. A monument has been erected to his memory in Munich. The most important of his many publications are: *Die Pathologie und Therapie der Ankylosen* (1862); *Vier chirurgische Briefe, etc.* (1866); *Lister's grosse Erfindung* (1875); *Sonst und jetzt* (1878); *Leitfaden zur antiseptischen Wundbehandlung, etc.* (1879); *Anleitung zur antiseptischen Wundbehandlung* (1881); *Die erste Hilfe bei Verletzungen* (1890).

NUT (AS. *knuhtu*, Icel. *hnot*, OHG. *nuz*, Ger. *Nuss*, nut). A hard, one-seeded, indehiscent (nonopening) fruit, which has usually come from an ovary of several carpels, as the acorn, hazelnut, etc. (See FRUIT.) The best-known and most valuable nuts are almonds, Persian or English walnuts, coconuts, pecans, Brazil nuts, hazelnuts, chestnuts, and the various hickory nuts, butternuts, etc., all of which are edible and of commercial importance. Strictly speaking, the peanut is not a nut, although commonly spoken of as such. The various nuts are considered under their separate headings.

In the fiscal year 1914 the United States imported almonds to the amount of 13,308,000 pounds shelled and 5,731,000 pounds not shelled, with an aggregate value of $4,678,000; and walnuts to the amount of 8,928,000 pounds shelled and 28,268,000 pounds not shelled, valued at $4,492,000. The value of the coconuts and copra imported amounted to $3,292,000, and of all nuts imported $19,782,924 against $5,471,166 in 1904. The exports of domestic nuts the same year amounted to $398,312. The most important nuts now grown commercially in the United States are the Persian or English walnuts, almonds, pecans, and chestnuts. The culture of the first two is confined almost entirely to California. The Persian walnut crop amounts to about 22,000,000 pounds a year, and the almond crop ranges from 3,000,000 to 6,000,000 pounds. Pecan orchards are largely confined to the Southern and Southwestern States and California, but the bulk of the crop, which amounts to about 10,000,000 pounds a year, is obtained from native trees in Louisiana and Texas. Commercial chestnut orchards are few in number in the United States, but they are increasing from year to year, European and Japanese varieties being largely used to top graft the small native sweet varieties. As with pecans, the bulk of the crop is produced on wild trees. Other native nuts of the United States, which have a greater local than commercial value, are black walnuts, butternuts, the various shellbark hickory nuts, hazelnuts, and chinquapin.

Food Value. From 50 to 65 per cent of the nuts most commonly eaten (almonds, Brazil nuts, filberts, hickory nuts, pecans, and walnuts) consist of shell. All of these nuts contain little water. The percentage of protein is fairly high, but fat constitutes the largest part of the edible portion, and carbohydrates, which are usually important constituents in vegetable foods, are generally present in small amounts. The chestnut, however, contains nearly 40 per cent carbohydrates. The percentage in coconuts, acorns, and litchi nuts is also fairly high. The meat of nuts, excepting those last mentioned, contains nearly 50 times as much fat and less than one-fifth as much carbohydrates as wheat flour, and has about double the fuel value, i.e., energy-producing power. A pound of unshelled nuts will furnish about half as much protein and the same amount of energy as a pound of flour. Owing to their high fuel value and low protein content, nuts would not make a well-balanced food when eaten by themselves. This is no reason, however, why nuts should not fill an increasingly large place in dietaries. Very few single foods supply the needed nutrients in the proper proportion to form a well-balanced ration. Foods rich in fuel constituents need to be combined with other foods of relatively high protein content.

The composition of a number of different kinds of nuts used as food is shown in the following table:

COMPOSITION OF NUTS

KIND OF NUTS	Refuse	Edible portion	COMPOSITION AND FUEL VALUE OF THE EDIBLE PORTION					
			Water	Protein	Fat	Carbohydrates	Ash	Fuel value, per pound
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Calories*
Almonds	64.8	35.2	4.8	21.0	54.9	17.3	2.0	3,030
Brasil nuts	49.6	50.4	5.3	17.0	66.8	7.0	3.9	3,329
Filberts	52.1	47.9	3.7	15.6	65.3	13.0	2.4	3,432
Hickory nuts	62.2	37.8	3.7	15.4	67.4	11.4	2.1	3,495
Pecans	53.2	46.8	3.0	11.0	71.2	13.3	1.5	3,633
English walnuts	58.0	42.0	2.8	16.7	64.4	14.8	1.3	3,305
Chestnuts, fresh	16.0	84.0	45.0	6.2	5.4	42.1	1.3	1,125
Chestnuts, dried	24.0	76.0	5.9	10.7	7.0	74.2	2.2	1,875
Acorns	35.6	64.4	4.1	8.1	37.4	48.0	2.4	2,718
Beechnuts	40.8	59.2	4.0	21.9	57.4	13.2	3.5	3,263
Butternuts	86.4	13.6	4.5	27.9	61.2	3.4	3.0	3,371
Walnuts	74.1	25.9	2.5	27.6	56.3	11.7	1.9	3,105
Coconut	48.8	51.2	14.1	5.7	50.6	27.9	1.7	2,986
Coconut, shredded	....	100.0	3.5	6.3	57.3	31.6	1.3	3,125
Pistachio, kernels	....	100.0	4.2	22.6	54.5	15.6	3.1	3,010
Pine nut or piñon	40.6	59.4	3.4	14.6	69.1	17.3	2.8	3,364
Peanuts, raw	24.5	75.5	9.2	25.8	38.6	24.4	2.0	2,560
Peanuts, roasted	32.6	67.4	1.6	30.5	49.2	16.2	2.5	3,177
Litchi nuts	41.6	58.4	17.9	2.9	.2	77.5	1.5	1,453

According to experiments with a diet of fruit and nuts, 75 to 82 per cent of the protein and 85 per cent of the fat were digested—the value for nut protein alone being presumably somewhat higher. The digestibility of nut carbohydrates is apparently about the same as that of carbohydrates in other foods. The belief that nuts are indigestible, i.e., digest with difficulty, causing more or less pain or distress, seems to be widespread, and perhaps has some basis in fact. It is quite probable that if the nuts were properly prepared and eaten at proper times much of this prejudice would disappear. There is also a general belief that salt eaten with them aids in their digestion. The present practice of munching them at odd hours, or as a dessert, when sufficient food has been taken to meet the requirements of the body, overtaxes the digestive organs and places the nut under a reproach that is, at least in part, undeserved. While most nut meats are generally eaten without any previous preparation, they may be used in a variety of ways. Chopped nut meats are much relished for sandwiches, and nut salads are not uncommon, while nuts, most commonly chestnuts, are often used as stuffing for roast fowl. The use of nuts in cakes, confectionery, creams, etc., is common. Large quantities of pecans are used by confectioners for making salted pecans and bonbons of various sorts, and in some European countries where the chestnut is abundant, bread is made from the ground kernels. The chestnut is also used in making puddings, cakes, etc. Many attempts have been made to prepare nut foods and to extend their use in various ways. An oil used for salad and other culinary purposes is expressed from beechnuts, walnuts, and very likely from others. Coconut oil is much used for culinary purposes, especially in the tropics. This and other nut oils also have various commercial uses.

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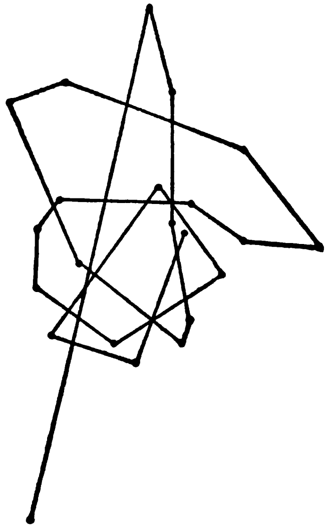
NÛT, nōōt. This Egyptian goddess, daughter of Shu and Tefnut, wife of Seb or, according to other accounts, of the sun god Rê, and mother of the gods Osiris, Isis, Set, and Nepthys, was the personification of the heavens and the sky. In the Pyramid texts she is the counterpart of the earth god Seb, but strictly speaking she is the sky in the day time. In the course of time, however, the distinction between a day and night sky was practically disregarded. She is usually represented as a naked woman bending, with feet and hands touching the ground, over Seb (the earth), who lies prostrate beneath her. Nût is also depicted as a cow uplifted by the god Shu and supported by other divinities, while over her body, which is adorned with stars, travels the bark of the sun. In the legend the sun god Rê, weary of ruling over the earth, retires to rest upon the back of the celestial cow, which typifies the goddess Nût. From the first to last she appears as a protectress of the dead. Consult K. R. Lepsius, *Ueber die Götter der vier Elemente* (Berlin, 1856); H. K. Brugsch, *Religion und Mythologie* (Leipzig, 1888–90); Alfred Wiedemann, *Religion of the Ancient Egyptians* (Eng. trans., New York, 1897); E. A. T. Wallis Budge, *The Gods of the Egyptians*, vol. ii (London, 1904).

NUTA'TION (Lat. *nutatio*, a nodding, from *nutare*, to nod). A vibratory motion of the pole of the equator due to the unequal attraction of the moon on the equatorial ring of the earth. Astronomers define the positions of the stars on the celestial sphere by means of their right ascensions and declinations (see Ascension, Right; Declination), which are analogous, respectively, to longitudes and latitudes on the earth. But one of the effects of gravitational attraction is to change the position on the sky of the celestial equator, thus altering continually the right ascensions and declinations of all stars. This alteration is called *precession* (q.v.). The general effect of precession is to cause the celestial pole to describe a circle around the pole of the ecliptic (q.v.) once in about 25,800 years. This rotation, however, is not quite uniform. It is subject to a small disturbance of about nine seconds of arc, called *nutation*. This nutation acts forward and backward about 1400 times in the course of one 25,800-year rotation of the celestial pole. The stars' right ascensions and declinations are therefore alternately increased and decreased by nutation, whereas precession generally acts in one direction over a great number of years.

NUTATION, in Plants. The bending movements executed by organs of plants, such as stems, leaves, roots, etc., by which the part is inclined successively in various directions. Nutations are due to the unequal rate of growth of different sides of the organ, an inequality which, so far as is known at present, is dependent upon internal (unknown) causes and is not called forth by the action of external stimuli. The word is also often used in a broad sense in the phrase *nutation movement*, to include all the movements in plants caused by growth in contrast to *variation movements* or movements produced by reversible turgor changes. See Irritability.

Simple nutation occurs in dorsiventral organs, such as flat leaves, both foliage and floral. The movements are only in one plane, being dependent upon the unequal growth of the opposite sides. When young the growth of the foliage leaves is most rapid upon their outer (dorsal) face, in consequence of which the leaf applies itself to the axis, arches over the apex, and with its neighbors forms a compact bud. Later growth becomes more rapid on the inner (ventral) face, the bud opens, and the leaves straighten out. Similar inequality of growth, but more sharply localized, leads to the folding and rolling of the leaf in the bud. (See Bud, *Vernation*.) Like movements of radial organs, such as stems, cylindrical leaves, and roots, have been termed circumnutation, or revolving nutation, to distinguish them from the simple nutation of dorsiventral organs. When any plant is in vigorous growth the axis rarely grows in length uniformly on all sides. The side on which growth is most rapid will push the apex over towards the side on which growth is less rapid. If the region of more rapid growth changes, shifting around the axis, the tip will be inclined successively to all points of the compass and with its simultaneous upward growth will describe a spiral, but, since the rate of growth is not uniform at successive intervals, the path described will be a very irregular spiral. A path of this kind, reduced to a plane, is shown in the accompanying figure.



NUTATION OF THE TIP OF THE PEA STEM.

The dots represent the observations; the line is drawn merely to show their serial relation. The true path is doubtless less angular.

Movements quite similar to those above described are called forth in plant organs as responses to external stimuli. Thus, twining plants exhibit both true nutation and nutation due to a geotropic sensitiveness. (See Geotropism in Plants.) Changes in temperature cause flowers to open or close by movements which resemble the simple nutation of dorsiventral organs. Thus, the tulip, crocus, and other vernal flowers are very sensitive to changes in temperature. The crocus can perceive a change of 0.5° C., and will respond to a change of 20° C. in two minutes.

NUT-BROWN MAID, The. An English ballad of the fifteenth century, telling the story of a high-born lady who remains true to her feignedly outlaw lover through the tests he uses. The originals are supposed to have been the Earl of Cumberland and Margaret Percy. The earliest version is found in Arnold's "Chronicle," a collection of London antiquities (1502). It was reprinted in 1707 in the "Muses' Mercury," and paraphrased by Prior in his "Henry and Emma" in 1718.

NUT'CRACKER. A bird of the crow family, of the genus *Nucifraga*. The form and characters are similar to those of crows, but the habits are rather those of jays, and in some respects indicate an approach to woodpeckers. One species (*Nucifraga caryocatactes*) is not uncommon in Europe and Asia, particularly in mountainous regions covered with pines. It is about the size of a jay, but has a longer tail. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The nutcracker frequents the tops of high pines, is shy, and breeds earlier than most birds and in a very secretive manner. Its food, apart from some insects in summer, consists of the seeds extracted from pine cones. These it holds with its feet while it works at them; but its ability to crack a nut, in spite of its name, is doubtful. The only American nutcracker (*Nucifraga columbiana*), usually called Clarke's crow, inhabits the pine regions of the West from Mexico to Alaska, and is gray with black and white wings and tail. It is noisy and gregarious, but during the breeding season it is shy. It builds its nest in the tops of tall pines and conceals it with care. The eggs are light grayish green marked with grayish brown and lilac. Consult: Elliott Coues, *Birds of the Northwest* (Washington, 1874); Alfred Newton, *Dictionary of Birds* (London, 1893–96); L. S. Keyser, *Birds of the Rockies* (New York, 1902); Dawson and Bowles, *The Birds of Washington* (Seattle, 1909). See Plate of Jays, Magpies, etc.; and Colored Plate of Eggs of Song Birds.

NUT′GALL, or Gall. See Gall Insects.

NUT GRASS. See Chufa, and Plate of Cypress, etc.

NUT′HATCH (formerly also *nuthack*, ME. *nuthake*, *nuttehake*, from *nut* + *hack*). A genus of birds of the family Sittidæ, having a straight bill and short legs, the hind toe very strong. Without any support from the tail these birds are able to creep both up and down the trunks and even along the underside of the branches, searching for food in the crevices of the bark. This is their usual method of progression. The genus is represented in North America by four species, of which the white-bellied nuthatch (*Sitta carolinensis*) is the commonest and best known. It is found throughout the whole United States and Canada, and is about 6 inches long, clear ashy blue above, white beneath, and with the crown rich, glossy, green black. It is abundant in most localities in the fall and spring and often during the winter, when its thrice-repeated querulous call, *nee-nee-nee*, is constantly heard; but in summer it is rather retiring. The nest is made in holes in trees, and the eggs, six to eight in number, are white, speckled with reddish and lilac. The other American species are the smaller red-breasted nuthatch (*Sitta canadensis*), the brown-headed nuthatch (*Sitta pusilla*) found in the South Atlantic and Gulf States, and the pygmy nuthatch (*Sitta pygmæa*), found from the Rocky Mountains to the Pacific. The last two species are only 4 inches long. The red-breasted nuthatch is found throughout temperate North America, but is not nearly so common as its white-breasted brother. The European nuthatch (*Sitta europæa*) is common in most parts of Europe. If taken young, it is easily tamed, and becomes very familiar and amusing. Several other species are known in Asia and Africa.

NUT′LEY. A town in Essex Co., N. J., 5 miles north of Newark, on the Morris Canal and on the Erie Railroad (Map: New Jersey, D 2). It contains the Nutley School, a Carnegie library, and an attractive high-school building. Nutley is essentially a residential suburb of New York, and has many fine homes. The chief industrial establishments are paper and woolen mills. The town adopted the commission form of government in 1912. Pop., 1910, 6009; 1915 (State census), 8001.

NUT′MEG (ME. *nutmegge*, *nutmege*, from *nut* + *muge*, OF. *muge*, musk, from Lat. *muscus*, musk). The kernel of the fruit of several species of *Myristica*, of the family Myristicaceæ, which contains about 80 species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. The fruit is succulent and opens like a capsule by two valves. The seed is nutlike, covered with a laciniated fleshy aril which appears in commerce as mace. The species which furnishes the greater part of the nutmegs of commerce is *Myristica fragrans*, or *Myristica moschata*, a tree about 25 feet in height, with oblong leaves and axillary, few-flowered racemes; the fruit, which is golden yellow when ripe, resembles a pear in size and appearance. The fleshy part of the fruit, which is rather hard, is of a peculiar consistence, resembling candied fruit, and it is often preserved and eaten as a sweetmeat. Nutmegs, which are chiefly used as a spice, are now successfully produced in the East Indies, Spice Islands, West Indies, and Brazil. They yield, by expression, a peculiar yellow fat, called oil of mace (because of its color and flavor it was generally supposed to be derived from mace), and by distillation is obtained an almost colorless essential oil which has very fully the flavor of the nutmeg. In 1913 the United States imported nutmegs to the value of $368,984.

Other species of *Myristica* yield nutmegs which, though sometimes used, are of inferior quality. The fruits of several species of Lauraceæ also resemble nutmegs in their aromatic and other properties, as the cotyledons of *Nectandra puchury*, the pichurim beans of commerce, and the fruit of *Acrodiclidium camara*, a tree of Guiana, the camara or ackawai nutmeg. The clove nutmegs of Madagascar are the fruit of *Ravensara aromaticum*, and the Brazilian nutmegs of *Cryptocarya moschata*. The calabash nutmeg is the fruit of *Monodora myristica*, of the family Anonaceæ. See Colored Plate of Flavoring Plants.

NUTMEG BIRD. A bird-dealer's name for one of the weaver birds (*Munia punctulata*), also known as the cowry bird. An East Indian fruit-(nutmeg-)eating pigeon of the genus *Myristicivora* is known as the nutmeg pigeon.

NUTMEG FLOWER. See Nigella.

NUTMEG STATE. Connecticut. See States, Popular Names of.

NU′TRIA. The local Spanish name in South America for the coypu (q.v.), also called racoonda, and the trade name for its fur.

NUTRITION, nū-trĭsh′ŭn (from Lat. *nutrire*, to nourish). The process by which living organisms appropriate, modify, and utilize the materials needful for their existence, growth, and development. The ultimate appropriation of food takes place in the individual cell, which seems to have a glandlike power not only of attracting materials from the blood, but of causing them to assume its structure and participate in its properties. A necessary complement to the process of assimilation is that of excretion, which consists in the discarding of effete matter—the products of its own vital activity—by the cell. In modern terminology the assimilative or building-up process is called anabolism, the disassimilative or breaking-down process is called katabolism, and the sum of the two metabolism (q.v.). The blood is the medium through which nutritive materials are brought to the cells and excreted products are carried off. It is borne by the capillaries to the several tissues of the body and is the source from which they derive the materials for their growth and development; and there is a direct relation between the vascularity of any part and the activity of the nutritive operations which take place in it. Thus in muscle, skin, and mucous membrane, and in nerve tissue, rapid decay and renovation are constantly going on, and in these tissues the capillaries are most abundant; while in cartilage and bone, tendon and ligament, disintegration is comparatively slow and the capillaries fewer.

All the processes of development and growth are the results of the plastic or assimilative force by which living bodies are able to form themselves from dissimilar materials, as when an animal subsists on vegetables or when a plant grows by appropriating the elements of water, carbonic acid, and ammonia; but they are the results of this force acting under different conditions.

Development is the process by which each tissue or organ of a living body is first formed, or by which one, being already incompletely formed, is so changed in shape and composition as to be fitted for a function of a higher kind, or finally is advanced to the state in which it exists in the most perfect condition of the species.

Growth, which commonly concurs with development and continues after it, is properly mere increase of a part by the insertion or superaddition of materials similar to those of which it already consists.

Nutrition, on the other hand, is the process by which the various parts are maintained in the same general conditions of form, size, and composition.

In the elementary forms of animal and vegetable life, represented on the one hand by the amœba and on the other by bacteria, the process of nutrition is a comparatively simple one. They are surrounded by a material which they can use as food, and each individual cell, being fitted to digest and absorb, appropriates what it needs and rejects what it does not require. In the higher animals, however, careful selection and a high degree of preparation and modification of the food are necessary; and these processes are carried on in the digestive canal and by the secretions of the glands (q.v.) which open into it. The phenomena attending the elaboration of food and its preparation for assimilation by the tissues are described under Digestion, Organs of.

In order that nutrition may proceed normally, certain conditions must be present. The blood must be normal in composition and amount and circulate with suitable rapidity; there must exist a certain nervous stimulation and control; and the part to be nourished must be able to appropriate the materials brought to it by the blood. The dependence of nutrition upon the first of these conditions is shown in anæmia, in which disorder the contents and carrying capacity of the blood are lowered and nutrition correspondingly depressed. The influence of the nervous system is demonstrated by the atrophy or even death of a part which follows the destruction or cutting off of its nerve supply. This often happens in certain diseases of the spinal cord.

The influence of the ductless glands on growth and metabolism has been attentively studied by physiologists in late years. The subject will be discussed at length under Secretions, Internal (q.v.). The principal ductless glands are the thyroid, thymus, parathyroid, suprarenal, the spleen, and the pituitary body; but it is believed that the glands having ducts and a known secretion elaborate in addition an internal secretion. The liver, pancreas, testis, and ovary are credited with secreting substances which have a profound but selective influence on nutrition and development.

It is not only necessary that the body should be supplied with food in order that its natural functions may be performed, but it is equally necessary that the food supplied should consist of the proper materials. Each animal by instinct seeks those substances which best meet the needs of its own metabolism, and man endeavors to supply himself with food suitable to the conditions under which he lives, and alters his diet with respect to season, latitude, age, activity, and occupation. Food is intended to supply the place of that which is given out by the body. But in the choice of diet this is not enough; the food should be sufficient to meet such needs without waste and without increasing unduly the output of excreta, while the organism should be maintained in health. Careful analysis of the excreta shows that they are made up, besides water, chiefly of carbon, hydrogen, oxygen, and nitrogen, but that they also contain, although in smaller amounts, sulphur, chlorine, potassium, and certain other elements. To balance this waste it is evident that food must be supplied containing all these elements in something like the proportion in which they are excreted; i.e., a mixed diet is necessary. Experiments upon the lower animals have shown that a diet composed exclusively of one class of food, such as fat or sugar, results in the death of the animal after a longer or shorter period of time. See Diet.

The requisite proportions of food required to maintain normal nutrition are variously given by several authorities, as shown in the following table.

AUTHOR	Protein	Fat	Carbohydrate	Calories
	Grams	*Grams*	*Grams*	
Voit	118	56	500	3,055
Rubner	127	52	509	3,092
Moleschott	130	40	550	3,160
Munk	105	56	500	3,022
Wolff	125	35	540	3,030
Playfair	119	51	531	3,140
Atwater	125	125	450	3,520
Average	121	59	510	3,135

Consult: Michael Foster, *Textbook of Physiology* (new ed., New York, 1904); the chapters on "Metabolism," "Nutrition and Diet," in W. S. Kirke, *Handbook of Physiology* (8th ed., ib., 1914); C. E. Sohn, *Nutrition* (ib., 1914). See Respiration; Secretion. For the effect of quantity and quality of food on certain animals, see Evolution, *Polymorphism*.

NUTRITION, in Plants. In its widest sense the nutrition of plants includes all processes by which food and other nutrients are obtained and used. The food of plants consists of organic material. Even the green plants require organic food, which they manufacture out of the simpler substances, carbon dioxide and water, that they absorb. The mode in which plants obtain both foods and other nutrients is described under the head of Absorption. (For the nature of the materials which plants require, see Food in Plants.) Reserve foods are stored in the special tissues or organs. Such materials must be moved first from regions of absorption or manufacture to the points of storage and, after digestion at some later time, thence to the regions of growth. Having been brought to the regions of growth, some of the food is used for the supply of energy to the protoplasm, either directly or after incorporation into the substance of the protoplasm itself. The energy is released through the process of oxidation and the by-products are carried away. All processes of nutrition connected with the release of energy for growth and movement constitute the functions called respiration and fermentation (q.v.). Other portions of the food are utilized for the making of new parts. See Assimilation; Digestion; Growth; Photosynthesis; Storage.

NUT RUSH. See Cyperaceæ.

NUTT, nŭt, Alfred Trubner (1856–1910). An English folklorist and Celtic scholar, born in London and educated at the University College School and the Collège de Vitry, France. He studied the publishing business in Leipzig, Berlin, and Paris from 1874 until 1877, and then succeeded to that of his father in London. He was one of the original members of the Folk-Lore Society, became its president in 1897, and was a founder of the Irish Texts Society in 1898. His publications are: *The Legend of the Holy Grail, with Especial Reference to the Hypothesis of the Celtic Origin* (1888); *The Voyage of Bran* (2 vols., 1895–97); *Celtic and Mediæval Romances* (1899; 2d ed., 1904). He founded the *Folk-Lore Journal* (afterward *Folk-Lore*) and made several contributions to the *Folk-Lore Record* and *Popular Studies.*

NUTTALL, nŭt′a̤l, George Henry Falkiner (1862–). An English biologist, who was born in the United States, at San Francisco. He graduated M.D. from the University of California in 1884 and Ph.D. at Göttingen in 1890, was assistant and associate at Johns Hopkins (1891–94), a member of the staff of the Hygienic Institute, Berlin (1894–99), and then lecturer in bacteriology and reader in hygiene in the University of Cambridge (England), where, in 1906, he was appointed Quick professor of biology. He also served as examiner at Cambridge, at the University of Liverpool, and for the Royal Army Medical Corps. Nuttall, in 1892, found the *Bacillus aërogenes,* in 1895 he demonstrated that bacteria in the alimentary canal are not necessary for a perfect digestion in healthy animal life, and in 1899 he showed the rôle played by insects, arachnoids, and myriapods as transmitters of bacterial and parasitic diseases. Besides some 150 articles in professional journals, he published: *Hygienic Measures in Relation to Infectious Diseases* (1903); *Blood Immunity and Blood Relationship* (1904), establishing the identification of different kinds of blood; *The Bacteriology of Diphtheria* (1908), with Graham Smith and others; *Ticks* (1908 et seq.), with C. Warburton and others; *The Drug Treatment of Canine Piroplasmosis* (1910); *Russian Ixodoidea* (1912); *The Training and Status of Public Health Officers in the United Kingdom* (1913). He also was editor and founder of the *Journal of Hygiene* (1901) and of *Parasitology* (1908).

NUTTALL, Thomas (1786–1859). An American botanist and ornithologist born at Settle, Yorkshire, England. Coming to the United States in 1808, he established himself in Philadelphia. Nuttall became much interested in botany and, though by trade a printer, devoted a large part of his time to explorations in the regions east of the Mississippi River. The results of these researches he published in 1818 as *The Genera of North American Plants.* He later made several trips through the region west and southwest of the Mississippi River, and in 1825 was appointed curator of the Harvard Botanical Gardens. This position he resigned in 1834 and with J. K. Townsend joined an expedition led by Captain Wyeth to the Pacific coast. From California he went to the Sandwich Islands, returning around Cape Horn. From 1841 till his death he lived in England. His writings include, besides the work mentioned above, *A Journal of Travels into the Arkansa Territory* (1821; vol. xiii of *Early Western Travels,* ed. by R. G. Thwaites, 1905); *A Manual of the Ornithology of the United States* (1832–34); *Narrative of the Pacific Expedition* (1839); *The North American Sylva: Trees not Described by F. A. Michaux* (1842–49).

NUTTALL, Mrs. Zelia (?–). An American archæologist, born at San Francisco. She was educated in France, Germany, and Italy, and at Bedford College, London; made extensive studies in Mexican antiquities, history, and languages; and ranks as a leading authority on Mexican archæology and ancient picture writing. She first came into prominence through the publication of her work on "The Terra Cotta Heads of Teotihuacan" in the *American Journal of Archæology* (1886). The following year she became an honorary special assistant of the Peabody Museum, and in 1908 was named honorary professor of the National Museum of Mexico. She prepared a facsimile edition of an ancient Mexican codex, the Codex Nuttall (1902), and published, in addition to this and numerous papers, *The Fundamental Principles of Old and New World Civilization* (1901); *Book of the Life of Ancient Mexicans* (1903); *Penitential Rite of the Ancient Mexicans* (1904); *New Light on Drake: Documents Relating to his Voyage of Circumnavigation 1577–1580* (1914).

NUTTING, Charles Cleveland (1858–). An American zoölogist, born at Jacksonville, Ill. He graduated from Blackburn University (1880) and received the M.A. degree from the same institution in 1882. He conducted various zoölogical expeditions—in Central America for the Smithsonian Institution (1882–84), in Florida (1885), on the Saskatchewan River (1891)—and was naturalist of the *Albatross* Hawaiian expedition in 1902. He was professor of zoölogy and curator of the Museum of Natural History of the University of Iowa from 1886 to 1890 and thereafter was head of his department. Nutting's most important publications are systematic papers dealing with the hydroids, which appeared in the reports of the United States Commission of Fisheries and elsewhere and were reprinted, especially *American Hydroids* (part i, 1900; part iii, 1915).

NUT WEEVIL. Any one of several species of weevils, of the family Curculionidæ, which infest chestnuts, hickory nuts, and other nuts. They belong to the genus *Balaninus,* and are of rather large size, usually clay yellow in color, and possess an exceedingly long, slender beak or snout. By means of this beak they puncture the burs of young chestnuts, the husks of hickory nuts and walnuts, and the coverings of young acorns, reaching nearly to the centre of the nut and placing an egg in the hole thus made. The larva, which is a stout white grub, eats out the interior of the nut and burrows its way through the shell, and then enters the ground to pupate.

NUU. An Egyptian deity. See NÛ.

NUX VOM′ICA (Neo-Lat., vomit nut, from Lat. *nux*, nut, and Neo-Lat. *vomicus*, relating to vomit, from Lat. *vomere*, to vomit). The pharmacopœial name of the seed of *Strychnos nux vomica*, or *poison nut*. The seeds, which are imported from the East Indies, are nearly circular and flat, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray color, thickly covered with short satiny hairs, internally translucent, tough, and horny, intensely bitter, and inodorous. They should contain not less than 1.25 per cent of strychnine.

The nux vomica tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish oblong, stalked, smooth leaves and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp. The bark is sometimes known as *false angostura bark*, having been confounded with angostura bark in consequence of a commercial fraud; but its properties are very different, as it is very poisonous.

The seeds contain (in addition to inert matters, such as gum, starch, woody fibre, etc.) two alkaloids closely related to each other, which act as powerful poisons on the animal frame and speedily occasion violent tetanic convulsions and death. These alkaloids or bases are named *strychnine* and *brucine* (qq.v.).

Nux vomica is poisonous in a greater or lesser degree to most animals. In very small doses its effects upon man are those of a general tonic, acting as a stimulant to digestion, circulation, respiration, and the nervous system. It seems to exert a selective action upon the cells of the anterior horns of the spinal cord. In larger doses there is a disordered state of the muscular system; the limbs tremble; a slight rigidity or stiffness is felt when an attempt is made to put the muscles in action; respiration is jerky and there is a sense of uneasiness. If the medicine is continued these effects increase in intensity and the voluntary muscles are thrown into a convulsed state by very slight causes, as, e.g., by inspiring more deeply than usual or even by turning in bed. In paralysis the effects are most marked in the paralyzed parts. In toxic doses the drug paralyzes the functions of the spinal cord, and the respiratory centres, death resulting from suffocation. The symptoms closely resemble those of tetanus. It is difficult to say what is the smallest dose that would prove fatal to an adult. Thirty grains of the powdered nuts are known to have had a lethal result. Three grains of the extract have proved fatal; half a grain of strychnine sulphate caused death in 14 minutes. Its chemical antidote is tannin, which forms a partially insoluble compound. See STRYCHNOS.

NUYSSEN, ABRAHAM JANSSENS VAN. See JANSSENS VAN NUYSSEN, ABRAHAM.

NYACK, nī′ăk. A village in Rockland Co., N. Y., picturesquely situated on the west bank of the Hudson River, at the broad expansion called Tappan Bay, opposite Tarrytown, with which it is connected by ferry, 29 miles by rail north of New York City; on the Erie, the New York, Ontario, and Western, and the West Shore railroads (Map: New York, Insert, A 2). It is popular as a place of residence and as a summer resort and has a Carnegie library. There are cloth-finishing and yacht and boat building establishments, also manufactories of shoes, sewing machines, carriages, sleighs, etc. Nyack was settled about 1700, was incorporated as a village in 1873, relinquished its charter in 1876, and was reincorporated in 1883. The government, under a general village law, revised in 1897, is vested in a president and board of trustees. The water works are owned and operated by the village. Pop., 1900, 4275; 1910, 4619.

NYAM-NYAM. An African people. See NIAM-NIAM.

NYAN, nyän. The name in Ladak for an argali (q.v.).

NYANGWE, nyăng′wĕ. A trading station on the upper Congo, in Belgian Congo, Central Africa (Map: Congo State, E 3). Nyangwe was visited by Livingstone in 1871, and was the starting point for Stanley's expedition to the mouth of the Congo in 1876.

NYANZA, nyăn′zȧ. A word in the eastern Bantu languages meaning "great water" and applied to several of the large lakes in Central Africa. See LAKE EDWARD; LAKE ALBERT; NYASA; VICTORIA NYANZA.

NYASA, nyä′sȧ (a form of the Bantu word *nyanza*, meaning "great water"). One of the large lakes of southeast Africa. It is situated southeast of Lake Tanganyika and about 380 miles from the Indian Ocean, between lat. 9° 30′ and 14° 25′ S. (Map: Belgian Congo, F 5). It is 340 miles long from north to south, with an average breadth of 40 miles and an area of 14,200 square miles. Near its south and east shores it reaches a depth of 700 feet, and in many places its bottom lies below the surface of the Indian Ocean, but it becomes shallow towards the north and west. It closely resembles Lake Tanganyika (q.v.) in shape and formation, both lying in the great rift valley formed by deep fissures in the great plateau. Lake Nyasa is surrounded on all sides by mountains, which on the east coast in the Livingstone Mountains are from 5000 to 10,000 feet high. Between these and the shores there is an intervening strip of low, sandy or marshy alluvial land from 2 to 10 miles wide, except in the northeast, where the mountains approach close to the water's edge. On the west the mountains are broken in several places by gaps through which rivers find their way to the lake, which is drained southward into the Zambezi through the Shire River. Anchorage can be found in some of the creeks and river mouths, and several British and German steamers ply regularly on the lake. Lake Nyasa was discovered by Livingstone in 1858.

NYASALAND PROTECTORATE. A British dependency in southeastern Africa. It was organized in 1889–91, being called Nyasaland Protectorate until February, 1893, British Central Africa Protectorate from that date until October, 1907, and thereafter Nyasaland Protectorate. The protectorate comprises chiefly an elongated territory lying between Lake Nyasa on the east and Northern Rhodesia on the west and separated on the north from German East

Africa by the river Songwe. South of Lake Nyasa the protectorate dips into Portuguese East Africa nearly to the Zambezi River. The protectorate is crossed by the thirty-fourth and thirty-fifth meridians of east longitude and extends from about lat. 9° 30′ S. to about 17° 10′ S. The estimated area is 39,315 square miles. Much of the country is high table-land. The principal river is the Shire, which flows from the southern end of Lake Nyasa to the Zambezi. There are two distinct types of climate, one of the Shire valley and the shores of Lake Nyasa, the other of the Shire Highlands and the other elevated parts of the country. The lower regions have an average annual rainfall of 35 inches, and in summer the temperature reaches 120°. In the higher regions the climate is pleasant, the maximum summer temperature being about 97° and the minimum winter about 40°. In the Shire Highlands the annual rainfall varies from 40 to 100 inches. The principal products are cotton, tobacco, coffee, tea, rubber, chilies, rice, corn, and wheat. Coffee, formerly the staple product, has declined in importance, while the culture of cotton and tobacco has notably developed. In the year 1909–10 imports were £127,742 and exports £131,225; in 1913–14 imports were £208,711 and exports £266,089. Of the imports over 70 per cent come from the United Kingdom. A railway is in operation from Port Herald, on the Shire near the southern end of the protectorate, via Chiromo to Blantyre, 113 miles. An extension from Port Herald to the Zambezi has been undertaken and thence is projected to the port of Beira, in Portuguese East Africa. Another extension is projected from Blantyre via Zomba to Fort Johnston, on Lake Nyasa. From the Portuguese port of Chinde steamers ply the Zambezi and part way up the Shire; steamers also ply Lake Nyasa. There are upward of 3400 miles of roads. The protectorate is traversed by a telegraph line, connecting with the German and Rhodesian systems; total length in Nyasaland, over 800 miles. Post offices, 26.

The administration of the protectorate was transferred from the Foreign Office to the Colonial Office in March, 1904, the chief executive official being a commissioner, whose title in October, 1907, was changed to governor and commander in chief. At the latter date executive and legislative councils were established. The seat of government is Zomba. In the year 1912–13 the local revenue (about half derived from the hut tax) was £128,273; grant in aid, £5000; loan, £50,000; the expenditure was £166,361.

The population, as reported for March 31, 1914, was 799 Europeans, 408 Asiatics, and 1,063,912 natives. The natives show little disposition to turbulence, and since the British put an end to slave trading life and property in the protectorate have been regarded as safe. The chief town is Blantyre, in the Shire Highlands, where there are about 300 Europeans. Other settlements are Zomba, Port Herald, Chiromo, Limbe, Liwonde, Kagoma, Fort Anderson; on Lake Nyasa are Fort Johnston, Kotakota, Bandawe, Nkata, Ndowa, and Karonga. In 1914 there were 1952 schools, with 130 European teachers and about 129,000 pupils. There are no government schools, native education being in the hands of missionary societies. Instruction is chiefly of a practical character.

The discovery of Lake Nyasa by Livingstone in 1859 was the immediate cause of the influx of a vast number of traders and missionaries. The various missionary societies which attempted to Christianize the country were the direct forerunners of the African Lakes Trading Corporation. The period between 1885 and 1898 is marked by a long series of bitter conflicts between the British traders and the Arabs and other Mohammedan adventurers. Sir Harry H. Johnston (q.v.) played a very prominent part in the subjection of the country and the development of the abundant natural resources.

Consult: Sir H. H. Johnston, *British Central Africa* (London, 1897); H. Caddick, *A White Woman in Central Africa* (ib., 1900); J. S. Moore, *The Tanganyika Problem* (ib., 1903); H. L. Duff, *Nyasaland under the Foreign Office* (2d ed., ib., 1906); Sir Alfred Sharpe, "The Geography and Economic Development of British Central Africa," in *Geographical Journal* (ib., 1912).

NYĀYA, nyä′yȧ (Skt. *ni*, into, and *āya*, going, from *i*, to go; hence entering, analysis). The name of the sixth and latest of the orthodox systems of ancient Hindū philosophy.

Of the six systems the Mimamsa and Vedanta are grouped together as more closely connected in dealing with divine and spiritual matters. The Nyāya and Vaiseshika systems form a group, having in common especially the atomic theory of the universe and a clear and logical classification of ideas. The latter feature is particularly characteristic of the Nyāya system, so that it is commonly spoken of as Logic, although it is really a philosophical system. The Nyāya agrees with all the other systems in promising to its followers final beatitude. The way to the attainment of supreme bliss is through a knowledge of the principles taught by this particular system, which lead to a proper comprehension of the truth. These principles are embodied in the 16 topics: *pramāṇa*, or means of knowledge, *pramēya*, or objects of inquiry, *saṁśaya*, or doubt, *prayōjana*, or purpose, *dṛṣṭānta*, or precedent, *siddhānta*, or tenet, *avayava*, or syllogistic member, *tarka*, or confutation, *nirṇaya*, or ascertainment, *āvda*, or discussion, *jalpa*, or wrangling, *vitaṇḍa*, or caviling, *hētvābhāsā*, or fallacy, *chala*, or prevarication, *jāti*, or futile objections, and *nigrahasthāna*, or failure in argument.

The great prominence given by the Nyāya to the method by means of which truth might be ascertained has sometimes misled European writers into the belief that it is merely a system of formal logic, not engaged in metaphysical investigations. It was, however, really intended to be a complete system of philosophical investigation; and some questions, such as the nature of intellect and articulated sound, or those of genus, variety, and individual, it has treated in a masterly manner.

The founder of the Nyāya system is said to have been Gotama, or Gautama. The events of his life and his date are quite unknown, though it is probable that the work attributed to him is, in its present shape, later than the work of the grammarian Panini (q.v.). It consists of five books, or *Adhyāyas*, each divided into two days or diurnal lessons, which are again subdivided into sections or topics, each of which contains several aphorisms, or *Sūtras*. Like the textbooks of other sciences among the Hindus, it has been explained by commentaries, which, in their turn, have been made the bases of more popular or elementary treatises.

The Nyāya system, like the kindred Vaiseshika, was originally atheistic. It became theistic later, but without acknowledging the existence of a personal God as a creator of matter. This feature, which it shares with the later form of the Vaiseshika, was elaborated in Udayanacharya's *Kusumānjali* (about 1200 A.D.) and in some other works.

The Sanskrit text of the Sūtras of Gotama, with a commentary by Visvanatha, was edited at Calcutta (1828), and the first four books, and part of the fifth, of the text, with an English version, an English commentary, and extracts from the commentary, by Ballantyne (Allahabad, 1850–54). More recent is the edition of the *Nyān Sūtras* at Benares (1896); Udayanacharya's *Kusumānjali* (Calcutta, 1895); and Dube's *Nyānyavārtikum* (ib., 1887–1904). Consult: Richard Garbe, *The Philosophy of Ancient India* (2d ed., Chicago, 1899); Max Müller, *The Six Systems of Indian Philosophy* (New York, 1903); Shāstrī, *Six Buddhist Nyāya Tracts in Sanskrit* (Calcutta, 1910); A. A. Macdonell, *History of Sanskrit Literature* (London, 1913). See Mimamsa; Sankhya; Sūtra; Vaiśēshika; Vēdānta; Yoga.

NYBLOM, nų'blôm, Karl Rupert (1832–1907). A Swedish poet and critic, born at Upsala. He studied at the university in his native town, gained the doctorate in 1857, and was professor of æsthetics and of the history of art and literature there from 1867 to 1897. His publications include some valuable studies of art under the title *Estetiska studier* (1873–84). His works in poetry include: *Dikter* (1860); *Bilder från Italien* (1864; revised as *Ett år i Södern*, 1883); *Nya Dikter* (1865); *Vers och Prosa* (1870); *Valda Dikter* (1876); *Rim och bilder* (1904). Besides these original works he translated Moore's *Melodies* (1858), the *Sonnets* of Shakespeare (1871), and works of American humorists (Mark Twain and others). After his death appeared *En sjuttiodrings minnen* (2 vols., 1908).

NYBORG, nų'bôrg. A seaport of Denmark, situated on the east coast of the island of Fünen, 17 miles southeast of Odense (Map: Denmark, D 3). There are an old Gothic church and the remains of an ancient palace, formerly a royal residence, but now used as an arsenal. The harbor is accessible for large vessels, and a line of ferryboats runs across the Great Belt to Korsör in Zealand. Nyborg is of considerable industrial importance, having large iron foundries, steam textile mills, and tobacco factories, besides a large trade in grain. Pop., 1901, 7785; 1911, 8470. Nyborg was founded in the twelfth century, and soon became one of the foremost cities of Denmark, being the regular meeting place of the early government assemblies.

NYC'TALO'PIA (Lat., from Gk. *νυκτάλωψ*, *nyktalōps*, night-blind, from *νύξ* *nyx*, night + *ὤψ*, *ōps*, face, eye). Night blindness. See Sight, Defects of.

NYC'TERIB'IA (Neo-Lat., from Gk. *νυκτερίς*, *nykteris*, bat + *βίος*, *bios*, life). An extremely curious genus of degraded, parasitic flies having neither wings nor balancers. It is the sole genus of the family Nycteribiidæ. It resembles the Hippoboscidæ in parasitic habits and in the retention of the eggs within the abdomen of the female until they have not only been hatched but have passed from the larva into the pupa state. The few species are all parasitic on bats.

NYC'TITROP'IC (from Gk. *νύξ*, *nyx*, night + *τροπή*, *tropē*, a turning, from *τρέπειν*, *trepein*, to turn). Change from day to night position in many plant organs induced by changes in surrounding conditions, especially in temperature and light intensity. The change in position may be brought about by a differential growth change on the two flanks of the organ or by similar turgor changes. In many flowers petals or perianth members bend outward by day, so as to open the flower, and inward by night, so as to close it. This is true of the crocus, tulip, dogtooth violet, and many others. Similar changes take place in the inflorescence, especially of Compositæ. The head of the dandelion, e.g., is opened by the flowers and involucral leaves of the head curving outward and closed by their turning inward. Foliage leaves often show day and night movements. In many leaves the night position is vertical and the day position approaches the horizontal. No general advantage of these movements to plants has been established, whatever may be true in individual cases.

NYD'IA. In Bulwer's *Last Days of Pompeii*, a blind flower girl.

NYE, Bill. See Nye, Edgar Wilson.

NYE, Edgar Wilson (1850–96), better known as Bill Nye. An American humorist, born at Shirley, Me. Nye's childhood was passed in Wisconsin. He went as a young man to Wyoming, studied law, was admitted to the bar there in 1876, was elected to the Legislature, and afterward served as postmaster and newspaper correspondent. His health failing, he returned to Wisconsin in 1883, but settled in New York in 1886, having already achieved wide popularity as a humorist, lecturer, and writer. His humor consists very largely in punning and in making free with the English tongue. The more noteworthy of his books are: *Bill Nye and the Boomerang* (1881); *The Forty Liars* (1883); *Baled Hay* (1884); *Bill Nye's Blossom Rock* (1885); *Remarks* (1886); *Chestnuts* (1887); *Railroad Guide* (1888), with James Whitcomb Riley; and, with the same, *Fun, Wit, and Humor* (1889); *The Cadi* (1891), a play; *Comic History of the United States* (1894); *Comic History of England* (1896). Nye died in Asheville, N. C.

NYIREGYHÁZA, nyĕ'rĕd-y'hä'zŏ. The capital of the County of Szabolcs, Hungary, on the Nyir, 130 miles northeast of Budapest (Map: Austria-Hungary, H 3). Situated near the Tokay wine region, the inhabitants are largely engaged in viticulture; other branches of agriculture are also profitably developed, and there are manufactures of soda, saltpetre, and matches; important annual fairs are held. Pop., 1900, 31,875; 1910, 36,984.

NYKÖPING, nų'chē-pĭng. A seaport of Sweden, situated on an inlet of the Baltic Sea, 50 miles southwest of Stockholm (Map: Sweden, F 7). It possesses regular steamship connections with the capital city and Norrköping, and has cotton and wool spinning establishments and an active trade in grain. Pop., 1901, 7375; 1910, 9810. In the Middle Ages Nyköping was one of the most important towns of Sweden.

NYLANDER, nų'lán-dẽr, William (1822–99). A Finnish botanist, born at Uleåborg. From 1857 to 1863 he was professor of botany at Helsingfors, and then settled in Paris. He left his valuable collections and his library to the University of Helsingfors. Nylander wrote on the lichens of Europe and of the tropics. *Essai d'une nouvelle classification des lichens* (1854); *Synopsis Lichenum* (vol. i, 1858–60; vol. ii, 1885, incomplete); *Addenda Nova ad Lichenographiam Europœam* (1865–88); *Lichens des environs de Paris* (1896; supplement, 1898); and books on the lichens of South America, Central America, New Zealand, Japan, the Pyrenees, etc.

NYLGHAU. See Nilgai.

NYM CRIN′KLE. See Wheeler, Andrew Carpenter.

NYMPH (Gk. Νύμφα, *Nympha*). In Greek mythology, a lesser divinity or spirit of the woods and streams. The nymphs are mortal, though gifted with long life and free from old age. Their homes are the groves and fountains, forests, meadows, and the sea. There were many classes of nymphs, such as the Nereids (q.v.) in the sea, the Naiads (q.v.) at the springs, the Dryads (q.v.) and Hamadryads in the trees, the Oreads on the mountains, the Oceanids (q.v.) in the sea, etc. The Naiads especially, as goddesses of the waters, were regarded as divinities of fruitfulness and increase. The cult of the nymphs was very widespread, but never attained special splendor. They were worshiped with Pan in caves, or at the springs where they dwelt. They are often associated, also, with Artemis, Apollo, and Dionysus. Consult F. G. Ballentine, "Some Phases of the Cult of the Nymphs," in *Harvard Studies*, vol. xv (Boston, 1904), and C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., ib., 1911).

NYMPH (from Lat. *nympha*, from Gk. *νύμφη*, *nymphē*, nymph, bride). The third stage of any insect which undergoes an incomplete metamorphosis. It is an active stage and in it the insect as a rule closely resembles the adult, except in not possessing wings. See Metamorphosis.

NYM′PHÆA′CEÆ (Neo-Lat. nom. pl., from Lat. *nymphœa*, Gk. *νύμφαια*, *nymphaia*, water lily, from *νύμφη*, *nymphē*, nymph, bride), the Water-Lily Family. A family of about 50 species of dicotyledonous plants growing in lakes, ponds, ditches, and slow rivers, in warm and temperate regions. Their large, long-stalked, heartshaped or peltate leaves float on the surface of the water, and the large, often beautiful and fragrant flowers either float or are raised slightly above the water. There are usually four sepals and numerous petals and stamens, often grading into one another. The many-celled ovary with radiating stigmas and numerous ovules in some of the genera is more or less surrounded by a large fleshy disk. The seeds have a farinaceous albumen and those of many species are used as food, as are also the rootstocks of some. The two genera of the United States are *Nymphœa* (pond lily) and *Castalia* (water lily). By some botanists the lotus (*Nelumbo*) and the water shields (*Cabomba* and *Brasenia*) are included in the water-lily family. See Euryale; Lotus; Nelumbo; Water Lily.

NYORO, nyŏ′rô, or **BA NYORO**. One of a group of powerful Bantu tribes living on the east side of Lake Albert Edward, Africa. They are the northernmost of the Bantu. They are as a rule good-looking, tall, and well proportioned, but their countenances are disfigured by their custom of extracting the four lower incisors. The huts are conical frames covered with thatch. Their weapons are spears, assegais or throwing spears, wooden shields, and bows and arrows. They make dugout canoes and rafts of bundles of papyrus for navigating the streams and lakes. Game and fish are caught with ingenious traps and nets. Their staple food is the sweet potato and grain, from which beer is brewed. The clan system prevails, and it is forbidden for a Nyoro to kill or eat the totem of his clan. The best-defined religious practice is the worship of ancestors, which grows out of the clan system. As ironworkers, weavers, and potters they show decided skill. They number about 110,000. Consult Sir H. H. Johnston, *The Uganda Protectorate* (New York, 1902).

NYRÉN, nụ-rān′, Magnus (1837–). A Swedish-Russian astronomer, born in Vermland, Sweden. He studied at Upsala and in 1868 was first engaged in the observatory at Pulkova, of which he was vice director from 1890 to 1908. In 1869 he obtained the doctorate and in 1888 was appointed Councilor of State. Nyrén made valuable researches for the determination of the constants of precession, nutation, and aberration, and wrote: *Détermination du coefficient constant de la précession au moyen d'étoiles de faible éclat* (1870); *Bestimmung der Nutation der Erdachse* (1873); *Die Polhöhe von Pulkowa* (1873); *L'Aberration des étoiles fixes* (1883); *Variations de la latitude de Poulkova* (1893); *Sur les détermination de la constante de l'aberration, exécutées à Poulkova* (1896); *Ergebnisse der 1899–1903 in Odessa beobachteten Durchgänge der Fundamentalsterne* (1906). In 1899 he was awarded the Valz prize by the Académie des Sciences, Paris.

NYROP, nụ′rôp, Kristoffer (1858–). A Danish philologist and author, born in Copenhagen. He was educated at the university of his native city, where he obtained the doctorate (1886) and where he became docent (1888) and in 1894 professor of Romance languages and literatures. His main work is *Grammaire historique de la langage française* (vol. i, 1899; 2d ed., 1904; vols. ii–iv, 1903–13). This brought him a reputation even in France, and in 1910 he lectured on this subject at the Collège de France. Others of his works are: *Den oldfranske Heltedigtning* (1883; It. trans. by E. Gorra, 1886), for which the author was awarded the Copenhagen University gold medal; *Sprogets vilde Skud* (1882); *Romanske Mosaiker* (1885); *Kysset og dets Historie* (1897); *Ordenes Liv* (1901; Eng. trans., 1901, Ger., 1903); *Fortids Sagn og Sange* (6 vols., 1907–09). In 1890–1903 Nyrop was editor of *Dania*.

NYS, nụs, Ernest (1851–). A Belgian international lawyer. He was born in Courtrai, was educated at Ghent, Heidelberg, Leipzig, and Berlin, practiced law in Antwerp, and held judicial posts there and in Brussels. Nys became professor of international law at the University of Brussels and a member of the permanent court of arbitration at The Hague. He was one of the editors of the *Revue de Droit International* and wrote: *La guerre maritime* (1881); *Le droit de la guerre et les précurseurs de Grotius* (1882); *Les origines du droit international* (1894); *Recherches sur l'histoire de l'économie politique* (1898; Eng. trans., 1899, by A. and N. Dryhurst); *Le droit international* (3 vols., 1904–06; new ed., 1912); *Idées mod-*

ernes: Droit international et franc-maçonnerie (1908); *Les Etats-Unis et le droit de gens* (1909).

NYS'SA. A genus of North American trees. See TUPELO.

NYSSA, SAINT GREGORY OF. See GREGORY OF NYSSA.

NYSTAD, nụ'stȧt. A town in the Län of Abo-Björneborg, Finland, situated on the Gulf of Bothnia, about 40 miles southeast of Abo (Map: Russia, B 2). It is noted for the treaty concluded here in 1721 between Sweden and Russia, by which the territory conquered by Peter I along the Gulf of Finland and the Baltic was conceded to Russia. Pop., 1913, 4500.

NYSTAGMUS, nĭs-tăg'mŭs (Gk. νυσταγμός, *nustagmos*, drowsiness). Involuntary, oscillatory, spasmodic movements of the eyeball resulting from eye, ear, cerebral, or cerebellar disease, and thus its presence or absence furnishes valuable data in the study of these diseases. *Miner's nystagmus* is a not uncommon affection among underground workers who have to strain their eyes in the dark and focus the vision at an inconvenient angle. See LABYRINTH.

NYX. See NOX.

O

O The fifteenth letter and fourth vowel in English, and a symbol for a sound in general common to all languages. Its form is derived through the medium of Latin from the Greek, and still more remotely from the Phœnician character. In Semitic the name of the letter was *ayin* (eye), having reference to the form of the letter, which must originally have been a pictograph. This Semitic letter represented a guttural breathing, the *'ain*, which did not exist in Greek. The sign was arbitrarily adopted by the Greeks to represent different *o* sounds, for the long sound of which they afterward developed the character omega (Ω). In postclassical times the names *omicron* (little *o*) and *omega* (big *o*) were given to these symbols. See ALPHABET.

Sound. In English the letter *o* is used to indicate two chief divisions of *o* sound: first the close or long *o*, the mid-back-round vowel heard in *old*, *no*, etc., which is sometimes represented also by digraphs, as in *sew*, *dough*, *tow;* second, the open or short *o* (called by Sweet a low-back-wide-round vowel), which may be wide, as in *hot*, *rot*, or narrow, as in *shorn*, *lord*. The main source of the English long *o* is an Old English *ā*, Ger. *ei*, Goth. *ai*, as in Eng. *stone*, AS. *stān*, Ger. *Stein*, Goth. *stains;* the short *o* is usually a retention of a West Germanic *o* as in *gold* (AS. *gold*, Ger. *Gold*). In pronunciation the standard English close or long *o* is never so close as the corresponding vowel in French or German. As a graphic device, moreover, *o* is sometimes used to express a *u* sound, as in *who*, *wolf*, *love*, *monk* (AS. *munuc*), etc. This spelling is really not orthographic, but was due to the Anglo-Norman scribes adopting a looped *o* instead of *u* when adjoining an angular pointed letter like *m*, *w*, *n*, *v*, where the vowel could not readily be distinguished by the eye. In some words this has even affected the pronunciation, as in "sovereign," and often "wont."

As a Symbol. In mediæval notation as a numeral *o* = 11; in chemistry O = oxygen; in logic it is the sign of the particular negative proposition; in music it signifies a null; and it is common in abbreviations, O.T. = Old Testament; O.H.G. = Old High German, etc.

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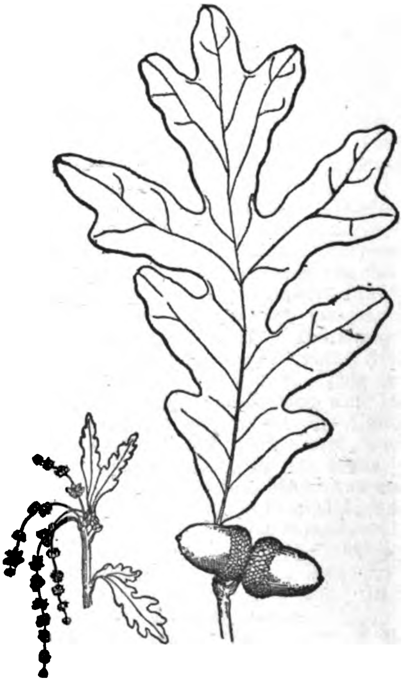
OAHU, ȯ-ä′hōō. One of the Hawaiian Islands (q.v.).

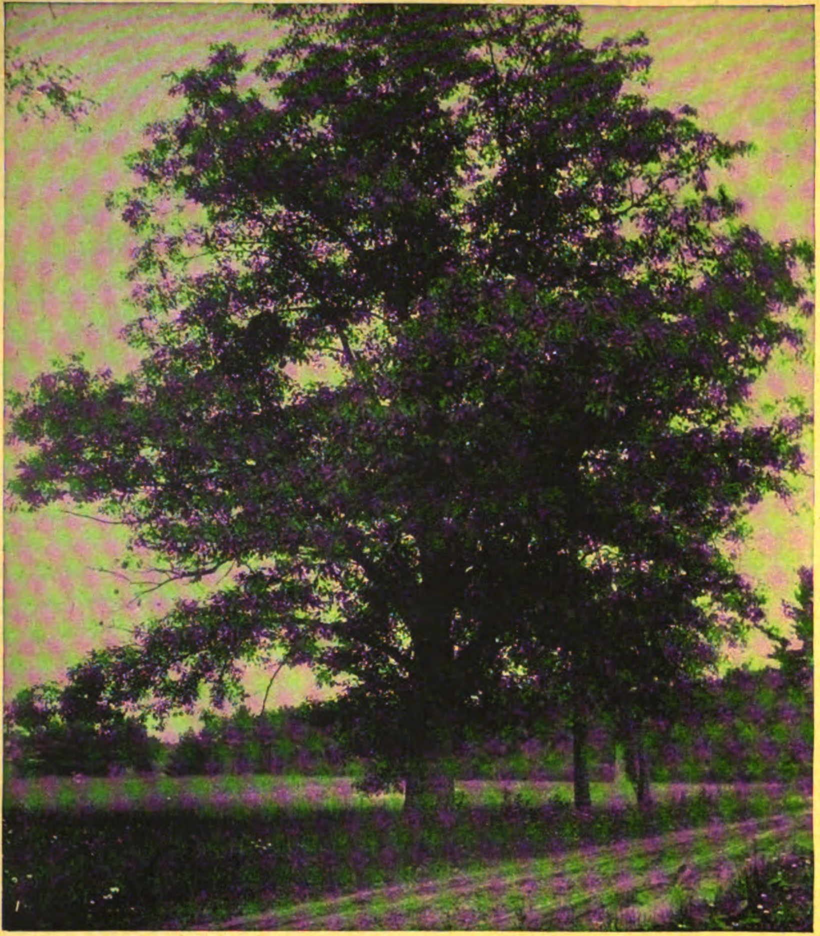
OAJACA, wȧ-HÄ′kȧ. A state and a city of Mexico. See OAXACA.

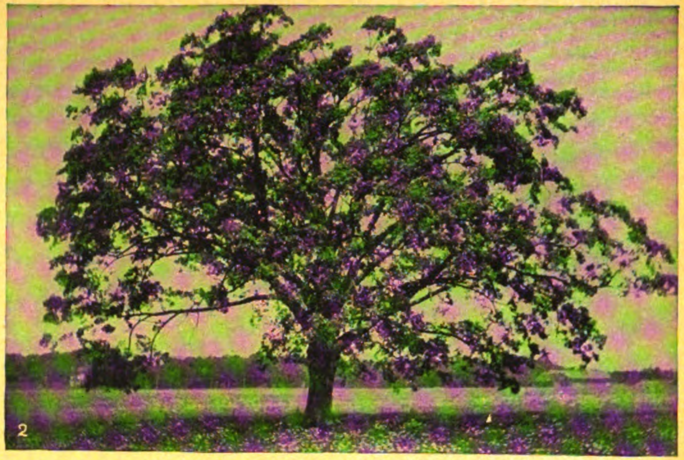
OAK (AS. *āc*, OHG. *eih* Ger. *Eiche*, oak; connected with Lat. *æsculus*, Gk. *αἰγίλωψ*, *aigilōps*, oak), *Quercus*. A genus of trees and shrubs of the family Cupuliferæ, having a three-celled ovary and a round (not angular) nut (acorn) placed in the lower part of, and more or less invested by, a scaly truncated cup. The species number about 300 and are natives of temperate and tropical countries. Several are found in Europe. North America produces many, and many are natives of Asia, especially of mountainous regions. None are found in tropical Africa, in Australia, or in South America except in the most northern parts. The oaks

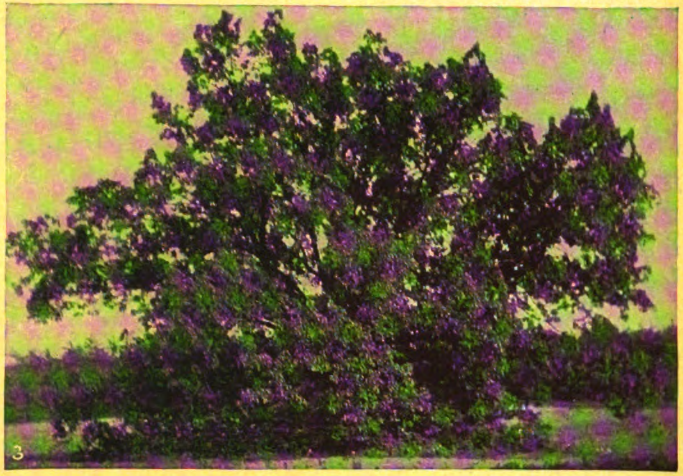


OAK (*Quercus alba*).

OAKS



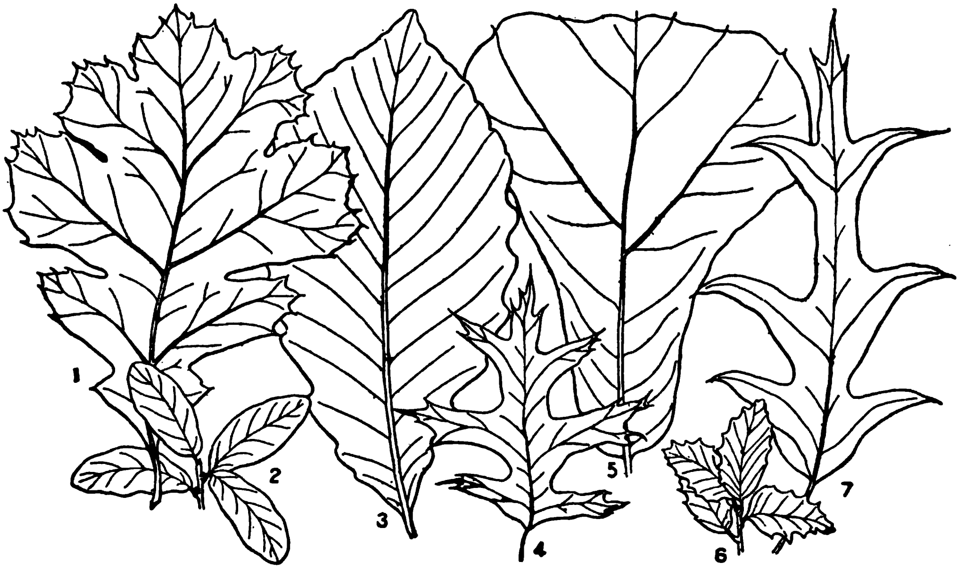




1. SCARLET OAK (Quercus rubra).

2. WHITE OAK (Quercus alba).
3 SPANISH OAK (Quercus digitata).

have alternate simple leaves, which are entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but more generally deciduous, when they have well-developed winter buds. The oaks are famous for strength and durability of their timber, the majesty of their appearance, and their great longevity. They reach maturity in from 120 to 200 years, according to the species, and well-attested specimens are known to be nearly 1000 years old. Some species rise tall and stately to a height of from 50 to 100 or even 150 feet, and have thick trunks and wide-spreading branches. The trunk is often 4, 6, or 8 feet in diameter. The oak succeeds best in loamy soils, and especially in those that are somewhat calcareous. The timber is very solid, durable, peculiarly insusceptible of the influence of moisture, and therefore eminently adapted to shipbuilding. It is also employed in carpentry, mill work, etc. The bark abounds in tannin, contains a peculiar bitter principle called quercine, and is used in medicine, chiefly in gargles, on account of its astringency, sometimes also as a tonic; it is used along with gallnuts in the manufacture of ink; but most of all for tanning (see BARK), on which account the oak is often planted as copsewood (see COPSE) in situations where it cannot be expected to attain great size as a tree. The acorns of some trees are also much less bitter than others, and species occur which produce acorns as sweet as chestnuts.



OAK LEAVES.

1, black oak (*Quercus velutina*); 2, live oak (*Quercus virginiana*); 3, rock chestnut oak (*Quercus prinus*); 4, pin oak (*Quercus palustris*); 5, blackjack oak (*Quercus marilandica*); 6, cork oak (*Quercus suber*); 7, Spanish oak (*Quercus digitata*).

Economically considered the principal oak of Europe, also distributed over western Asia, is *Quercus robur*, the British oak, of which there are two well-known varieties, *pedunculata* and *sessiliflora*, so named because in the former the acorn cups have stalks, in the latter not. These and other differences in habit have no apparent influence upon the value of the timber. Of these varieties, which some botanists call distinct species, *pedunculata* is more abundant in the north and *sessiliflora*, often called durmast oak, in the south. *Quercus pedunculata* grows in moist soils, while *Quercus sessiliflora* frequents drier situations. Both have been introduced into the United States, but they have proved short-lived. The Turkey or Adriatic oak, sometimes called Austrian oak (*Quercus cerris*), native to southeastern Europe, is large and valuable and extensively planted. Its leaves are acutely lobed and the cups of the acorns have long acute bracts, from which it is called mossy-cupped. The holm or evergreen oak (*Quercus ilex*) is an evergreen species occurring commonly in the south of Europe. It is more fully described under ILEX. The cork oak (*Quercus suber*), from the bark of which the cork of commerce is obtained, is a native of Spain and the north of Africa. (See CORK.) The Valonia oak (*Quercus ægilops*), of eastern Europe and Asia and extensively planted in Algeria and elsewhere, is celebrated for the amount of tannin, 25 to 32 per cent, contained in its acorn cups, large quantities of which are used in tanning leather. The gall oak (*Quercus lusitanica*), a common low shrub, native of Asia Minor, is noted for the galls produced upon its leaves by insects.

In the United States more than 50 species of oaks are found, with a score or more additional described varieties and hybrids. Some species are very restricted in their distribution, being known in only a single locality, while others range from Maine to Minnesota and southward to the Gulf of Mexico. The American species, and possibly the others, readily fall into two great groups, the white oaks and black oaks, respectively, the former with round-lobed, never bristle-tipped leaves, and acorns which ripen the first year; the latter with acute bristle-tipped leaf lobes and fruits which mature the second year. The American white oak (*Quercus alba*), a large tree of rather rapid growth and tough, hard, strong, close-grained wood, is one of the most valuable of timber trees. It is found from Canada to the Gulf and west to Texas. The bur oak, or mossy-cup oak (*Quercus macrocarpa*), is a large tree of much the appearance and distribution of the white oak and is one of the most valuable oaks for Western planting. Its timber is coarser grained and not so strong, but otherwise equals that of the former species. The red oak (*Quercus rubra*) and the scarlet oak (*Quercus coccinea*) are large, valuable trees that occupy about the same territory. They belong to the second class of oaks mentioned above. Their timber is coarse-grained, heavy, hard, and strong, and is used in various kinds of building and for furniture. No difference between the two is noticed in the lumber trade. The chestnut oak (*Quercus prinus*) is a large tree with a deeply furrowed bark and leaves resembling those of the chestnut. The bark, which is rich in tannin, is used extensively in tanning leather. The chinquapin oak, also called chestnut oak (*Quercus muhlenbergii*), and the dwarf chinquapin oak (*Quercus prinoides*), by some botanists referred to *Quercus prinus*, bear edible acorns. The yellow oak, or quercitron (*Quercus velutina*), yields a valuable bark for use in tanning, and a dyestuff, quercitron. The live oak (*Quercus virginiana*) is found growing in the rich moist soil from Virginia to Texas, also in California, Mexico, Central America, and Cuba. It is one of the hardiest of the evergreen oaks, attaining a height of 60 feet or more and a diameter of from 6 to 8 feet. It was formerly extensively used in shipbuilding. The Spanish oak of the southeastern United States is variously called *Quercus digitata* and *Quercus falcata*.

The name "oak" is given to many other trees and plants not related to *Quercus*. The African oak is a kind of teak (q.v.). In Australia a number of species of *Casuarina* (q.v.) are called oak, as are also species of *Grevillea*, etc. *Rhus toxicodendron* is often called poison oak in the United States.

Fossil oak leaves are known in the Cretaceous rocks, where are also found some forms intermediate between the oaks and chestnuts. These latter indicate for the two genera *Quercus* and *Castanea* a common ancestry in early Cretaceous times. In the Tertiary oaks were prominent members of the vegetation and ranged to far northern latitudes, for their leaves are found in the Lower Eocene beds of Disko Island, on the west coast of Greenland. See Forest Oak.

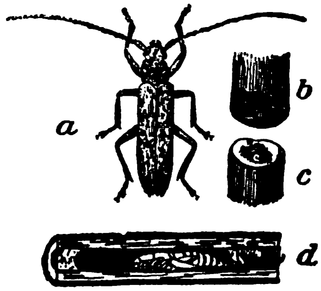
OAK APPLE, or Gall. See Gall Insects.

OAK CROWN, Order of the. A civil and military order of Luxemburg, founded in 1841 by King William II of the Netherlands. It has five classes and is conferred on distinguished artists. The decoration is an eight-pointed silver star, with a golden W beneath the royal crown on a green field, surrounded by an oak crown. The cross is suspended from an orange ribbon with three green stripes. The motto is *Je maintiendrai*.

OAKELEY, ōk'lĭ, Sir Herbert Stanley (1830–1903). An English organist and composer, born at Ealing, Middlesex. He was educated under native teachers and at Oxford University. Later he studied at the Leipzig Conservatory and privately (organ) with Schneider of Dresden and Breidenstein of Bonn. He held several university appointments as lecturer on musical topics, and received high degrees from most of the leading universities of Great Britain. He was composer (in Scotland) to Queen Victoria, and was knighted by her in 1876. His organ recitals were famous throughout the United Kingdom. His compositions include the cantata *Jubilee Lyrics*, a sonata op. 20, considerable Church music, songs, and an orchestral "suite in the olden style" (1893). Consult E. M. Oakeley, *The Life of Sir Herbert Stanley Oakeley* (London, 1904).

OAKES, ōks, Urian (1631–81). An American Colonial clergyman and poet, born in England. Brought to Massachusetts in 1634, he graduated at Harvard in 1649 and showed his precocity by the early publication at Cambridge of a set of astronomical calculations, and shortly afterward accepted a pastorate at Titchfield, England. His Nonconformist views compelled him to relinquish his pastorate in 1662, although later he preached to another congregation. On account of his learning and piety he was chosen pastor of the church in Cambridge, Mass., where he began his labors in 1671. He accepted the presidency of Harvard College in 1675 (being formally installed five years later), and held this position until his death, which occurred in Cambridge, Mass., July 25, 1681. He was an eloquent preacher, but is remembered chiefly for his *Elegy upon the Death of Thomas Shepard* (1677), one of the best and most elaborate of early Colonial poems. This poem has been more than once reprinted. For specimens and criticism, consult M. C. Tyler, *History of American Literature*, vol. ii (new ed., New York, 1897).

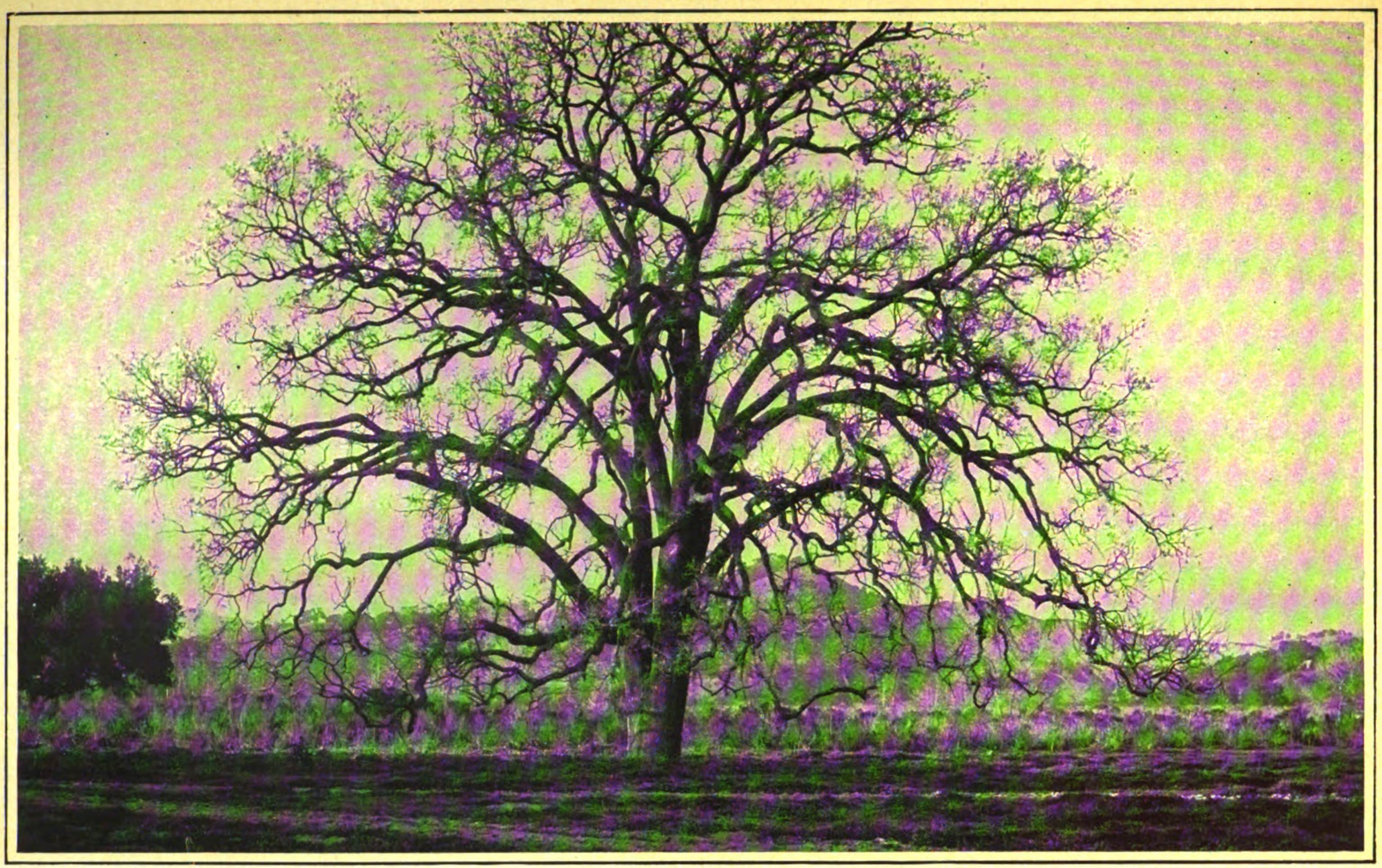
OAK INSECTS. The insect fauna of oak is very extensive. Between 500 and 600 species of insects have been recorded that live upon the different species of *Quercus*, and there are in addition many other species which live in decaying oak wood and oak stumps. In Germany 537 species of insects of all orders have been recorded by Kaltenbach as preying upon the oaks of that country. It has been estimated that it is not improbable that 1000 species of oak insects exist in the United States. The roots of the live oak, and probably of the water oak, are infested by a great longicorn borer (*Mallodon melanopus*) by which the trees are permanently dwarfed and their growth arrested. There are several species which burrow into the trunk, the most prominent being the caterpillar of the carpenter moth (*Prionoxystus robiniæ*), which occurs from New England to Texas and honeycombs the wood with large black burrows. Several flat-headed borers (Buprestidæ) and many bark-boring beetles (Curculionidæ) affect oak. The oak pruner (*Elaphidion villosum*) and the peri-



OAK PRUNER.

a, adult beetle (*Elaphidion villosum*); *b*, end of twig severed by larva from tree; *c*, reverse end containing maggot; *d*, same from side, split to show pupa within it.

WHITE OAK



WHITE OAK (Quercus alba), Santa Ynez Valley, California.

odical cicada (see Cicada) cut off the twigs and small limbs. The leaves of various oaks are eaten by many species of lepidopterous larvæ, the most prominent being the forest tent caterpillar (*Clisiocampa disstria*) and the large black and red striped spiny caterpillar of *Anisota senatoria*. These two caterpillars in the Atlantic and Central States, as a rule, do more harm to oak forests than all other species combined.

Several species of leaf rollers (see Leaf Roller) are found upon oak, and leaf miners (see Leaf Miner) frequently disfigure the leaves. There are also plant lice and scale insects which are confined to the trees of this kind, and the so-called gloomy scale (*Aspidiotus tenebricosus*) frequently endangers the life of half-grown trees, while the imported oak scale (*Asterodiaspis quercicola*) enfeebles the trees in many localities, disfiguring the smaller branches by pitting the tender bark with its peculiar depressions.

A striking characteristic of the insect fauna of oak is the occurrence of many kinds of galls produced mainly by gallflies of the hymenopterous family Cynipidæ. One hundred and eight distinct species of gallflies live upon oaks in the United States, each species making its characteristic gall either upon the roots, the twigs, the buds, or the leaves. Some of the most striking of the oak galls are: the oak potato gall, the large, hard, uneven swelling, resembling a potato in shape, growing upon white oak twigs and attaining a length of 2 inches or more; the woolsower gall, which consists of a round mass resembling wool, from the size of a walnut to that of a goose egg, growing on the side of or surrounding white oak twigs in June, pure white in color tinged or speckled with rose red; and the oak cup gall, which consists of a very curious swelling on the acorn cups, terminating in a bunch of curly, woolly fibres. Several galls are made by dipterous insects of the gall-midge family, Cecidomyiidæ. Consult A. S. Packard, *United States Entomological Commission, Fifth Report* (Washington, 1890). See Cerambycidæ.

OAK'LAND. A beautiful residential city with important industrial and commercial interests, and the county seat of Alameda Co., Cal., 6 miles across the bay from San Francisco, on the Southern Pacific, the Western Pacific, Oakland, Antioch, and Eastern, and Atchison, Topeka, and Santa Fe railroads (Map: California, C 5). Oakland has a healthful climate, is surrounded by beautiful scenery, and possesses fine drives and wide and level streets, 377 miles of which are paved. Steam ferries connecting with San Francisco and 225 miles of street railway demonstrate the city's accessibility as a residence district. Many private dwellings are finely situated and are notable. Particular mention may be made as well of the Macdonough Theatre, the public library, which contains nearly 30,000 volumes, the post office, Central and Union Savings Bank buildings, the city hall, and the $1,000,000 municipal Auditorium, as prominent architectural features. Oakland is the seat of St. Mary's College (Roman Catholic), established in 1863. Lake Merritt, in the centre of the city and connected with San Francisco Bay by a narrow inlet entering an indentation of the bay, is a popular resort.

The city, adjacent to a fertile agricultural and fruit-growing region, controls a large commerce as a railroad terminus and as a shipping centre, vessels and trains meeting here to exchange commodities. With its manufacturing advantages, it also has important industrial interests—shipbuilding yards, marble, smelting, and metallurgical works, flour, cotton, quartz, and planing mills, fruit-canning works, cordage, carriage, jute, and windmill factories, etc. The government is vested in a mayor and four commissioners, who compose the council, the commissioners being executive heads of the several departments allotted to them under the charter. Oakland spends annually (1914) in maintenance and operation about $3,550,573, the principal items of expense being $1,236,638 for schools, $307,105 for the police department, $363,095 for the fire department, $136,200 for municipal lighting, $425,000 for street department, and $262,500 for parks. The bonded debt of the city is about $8,000,000 and the assessed valuation of property, real and personal, amounts to $252,000,000. Oakland was incorporated as a town in 1852 and was chartered as a city in 1854. Pop., 1880, 34,555; 1890, 48,682; 1900, 66,960; 1910, 150,176, including 36,822 persons of foreign birth and 3055 negroes; 1914 (U. S. est.), 183,022. See Dams and Reservoirs.

OAKLEY, Violet (1874-). An American mural painter, illustrator, and designer. She was born in New York City, studied at the Art Students' League there, at the Pennsylvania Academy of Fine Arts, Philadelphia, under the illustrator J. Howard Pyle, and in Paris under Aman-Jean, Collin, and Lazar. She at first devoted herself to illustration, but later turned to mural painting, her first important commission being 13 panels depicting the "Founding of the State of Spiritual Liberty" for the Governor's reception room of the State Capitol at Harrisburg, Pa. Other decorations by her are in the church of All Souls and the church of All Angels, both in New York, the Pennsylvania Academy, and in some private residences, notably in Mr. Charlton Yarnall's in Philadelphia. Her work shows an illustrative quality akin to that of Edwin A. Abbey (q.v.), with flat surfaces, clever adjustment of figures to space, and a simple and unaffected presentation. The color is rich, flowing, and harmonious; the subject matter, presented with originality, is of marked spiritual and intellectual content. Among Miss Oakley's awards were gold medals at the St. Louis Exposition in 1904 and the Pennsylvania Academy in 1905. At the Panama-Pacific Exposition (1915) she received a medal of honor. She became a fellow of the Pennsylvania Academy and a member of the Society of Mural Painters and the Society of Illustrators. She made Philadelphia her home.

OAKLUNGS. A species of lichen. See Lungwort.

OAK'MONT. A borough in Allegheny Co., Pa., 10 miles northeast of Pittsburgh, on the Allegheny River and on the Pennsylvania Railroad (Map: Pennsylvania, B 6). It contains a Carnegie library and an attractive high school building. The chief manufactured products are tools, pipes and fittings, track tools, hot-water boilers, and structural steel. Pop., 1900, 2323; 1910, 3436.

OAK PARK. A village in Cook Co., Ill., 9 miles west of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, J 2). It is purely a residential suburb of Chicago and contains the Scoville Institute, two hospitals, a public library, and attractive high school and municipal buildings. The water works are owned by the municipality. Formerly a part of the town of Cicero, Oak Park was incorporated as a separate village in 1902. Pop., 1910, 19,444; 1914 (U. S. est.), 24,330.

OAK PRUNER. See OAK INSECTS; CERAMBYCIDÆ.

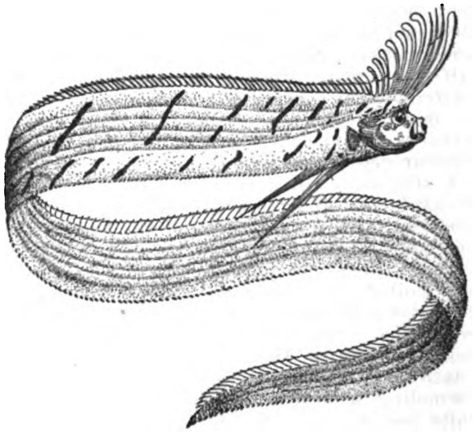
OAKS, THE. One of the most important English horse races, run at the Epsom Summer Meeting on the Friday following the Derby. The race is confined to three-year-old mares and is run over a course of 1½ miles. It was first run on May 14, 1779, was established by the twelfth Earl of Derby, and named by him in honor of his hunting box, "The Oaks," at Woodmansterne in Surrey.

OAK'UM (AS. *ācumba*, *ācemba*, OHG. *āohambi*, tow, oakum, from AS. *ā*, out + *cemban*, to comb). A tangled mass of tarred hempen fibres, made from old rope by untwisting the strands and rubbing the fibres free from each other until it is in about the same condition as the loose tow from flax and hemp hackling, of which it was made originally. Its principal use is in calking the seams between planks, the space round rivets and bolts, and the joints of water and other pipes, to prevent leakage. *White oakum* is made from untarred hemp.

OAK'VILLE. A town in Halton County, Ontario, Canada, situated on Lake Ontario and on the Grand Trunk Railway, 21 miles southwest (direct) of Toronto (Map: Ontario, F 7). It is connected with Hamilton by electric railway. Its manufactures include leather, baskets, boats, and aluminium ware. The town owns its electric-lighting system and water works. It is a summer resort. Pop., 1901, 1643; 1911, 2372; 1914 (local est.), 2972 (in summer about 3500).

OANNES, ō-ăn'nēz. The name of a Babylonian god found in the fragments of Berosus (q.v.). It is said that in the first year of the foundation of Babylon he came out of the Persian Gulf. He is described as having the head and body of a fish, to which were added a human head and feet under the fish's head and at the tail. He lived among men during the daytime, without, however, taking any food, and retired at sunset to the sea, from which he had emerged. Oannes instructed men in the use of letters and in all the principal arts and sciences of civilization, which he communicated to them. The story has not yet been found among the remains of Babylonian literature, and we are dependent, therefore, largely upon conjecture in attempts to identify Oannes with any of the Babylonian deities known. He is evidently the deity supposed to reside in the Persian Gulf, and this fact points to his identification with Ea, the chief deity of Eridu, a city that once lay at the Persian Gulf. Ea is a prominent figure in the religious literature and is distinctly a water deity. He is also portrayed as the source of wisdom, to whom Marduk (see MERODACH), the head of the Babylonian pantheon, goes for advice, and the fact that Marduk is represented as the son of Ea points to the great antiquity of the Ea cult and the reverence in which it was held. On Assyrian sculptures and on seal cylinders we find frequently the body of a man, but covered with fish scales, and it is likely that this is a representation of Ea. A difficulty, however, remains in accounting for the curious name, which yet must in some way be connected with Ea. Consult: Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); id., *Die Religion Babyloniens und Assyriens* (Giessen, 1902–12); Zimmern, in Eberhard Schrader, *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902).

OARFISH. One of the bandfishes or ribbon fishes of the genus *Regalecus*, family Regalecidæ. The body is much elongated and at the same time attenuated and compressed. The dorsal fin extends the whole length of the back, and the ventral fins consist only of a single long ray and often are dilated at the end; the mouth is small. Specimens 20 feet long have been taken. The anterior portion of the dorsal fin is produced so as to suggest a mane, and it is probable that most of the so-called sea serpents are referable to this fish. The only species (*Regalecus banksi*) is cosmopolitan in its distribution. See BAND FISH; UNICORN FISH.



BANKS'S OARFISH (*Regalecus banksi*).

OÁS, ō-äs'. A town of southern Luzon, Philippines, in the Province of Albay. It is situated on the main road, 16 miles northwest of Albay on the Inoya River. Oás is the centre of an important hemp-growing region and carries on a considerable river trade. Pop., 1903, 11,393.

OASIS, ō-ā'sĭs *or* ō'ā-sĭs (Lat., from Gk. *ὄασις*, oasis; connected with Coptic *ouahe*, dwelling place, oasis, from *ouih*, to dwell). A fertile place in a desert. As the barren condition of most deserts results from small rainfall, the presence of oases depends upon the occurrence of springs or streams which can be utilized for irrigation. In the Sahara there are mountains of sufficient height to provoke precipitation, and the neighboring lowlands may thus receive sufficient water to support vegetation. A water supply is frequently obtained also from wells located at considerable distances from regions of precipitation. A combination of soil that holds water, but prevents evaporation, is sometimes found, and greatly favors the formation of oases. See ARTESIAN WELLS.

OASTLER, ōst'lẽr, RICHARD (1789–1861). An English reformer, born at Leeds. He succeeded his father as steward of the Fixby estates in Yorkshire in 1820. In 1830 he addressed a letter to the Leeds *Mercury* protesting against the evils of child slavery in Bradford factories, and he led in the subsequent agitation that resulted in the passage of the Ten Hours Bill and other factory acts. He lost his stewardship in 1838 because of his opposition to the poor-law commissioners, and two years later his former employer had him imprisoned for debt. While in the Fleet he published weekly the *Fleet Papers* on reform topics. The workingmen of England and Oastler's personal friends raised enough to pay his debt, and he was released in 1844. He edited the *Home*, a weekly newspaper, in 1851–55.

OAT (AS. *āte*, of unknown derivation). Numerous species of plants of the genus *Avena*, belonging to the order Gramineæ, or grasses. The commonest species, characterized by loose panicles instead of spikes of flowers as in the case of wheat, barley, and rye, is of unknown nativity, but it is believed to have been derived from a single prehistoric form, probably a native of eastern temperate Europe and of Tartary.

The common cultivated varieties of oats are classified under two groups, or types, based on the form of the panicles, viz., common oats with open spreading panicles and Tartarian oats with contracted one-sided panicles. These types are sometimes considered as distinct species, the former as *Avena sativa*, the latter *Avena orientalis*. In general the varieties of oats differ in the color and thickness of the husk, the form of the grain, the length of the straw, and the time of ripening. In color they are usually yellow, white, or black. There are a number of species of but little importance, such as wild oats (*Avena fatua*), which is generally considered as a weed, but has become an abundant and valuable wild pasture grass in California; bristle-pointed oats (*Avena strigosa*), also a weed, but sometimes grown for green fodder; animated oats (*Avena sterilis*), so named from the fact that when the dry awn absorbs moisture it untwists and thus gives motion to the grain; and short oats (*Avena brevis*), cultivated for its grain at high elevation in the mountainous parts of France and Spain, ripening where other kinds do not, and also grown as a forage plant in other parts of Europe. See Colored Plate of CEREALS.

The oat is a hardy plant, especially well adapted to temperate climates, and is not cultivated to any great extent in hot countries. It is extensively grown in the United States and Canada, in Great Britain, and in the countries of northern Europe. It succeeds best in a cool, moist climate, but it will grow quite well in warmer regions if the soil is sufficiently moist. In hot and dry regions it grows very poorly. Oats are not a fastidious crop as to the character of the soil, and will grow on light or heavy soils, but are intolerant of excess of water. The seed bed for oats is prepared about the same as for wheat and barley, but not quite so deep. In the eastern United States the land is usually plowed before the oats are sown, but in the Western States, especially in new and fertile regions, they are frequently sown on corn land without plowing and covered with a corn cultivator or disk harrow, the surface of the soil being then smoothed with an ordinary harrow. When sown on unplowed land oats are generally broadcast, and on plowed ground the practices of both drilling and broadcasting prevail. On the whole, the greater portion of the crop is broadcast. From two to three bushels of seed is the usual quantity sown per acre. Oats are sown in the spring and in the fall. Spring-sown oats represent the bulk of the crop, while fall-sown or winter oats are limited to southern localities. When sown as early in the spring as possible the crop has the advantage of making most of its growth during the cooler part of the season, which is best adapted to its development. In northern latitudes it ripens in 90 days or even less, but in southern regions a longer time is required.

From 40 to 60 bushels per acre is considered a good yield, but much larger yields are sometimes obtained. Russia and the United States are the greatest oat-producing countries of the world. In 1912 the United States produced 1,418,337,000 bushels; in 1914, 1,141,060,000. The average yield per acre in the United States for the years 1905 to 1913, inclusive, was 29.6 bushels. The highest average yields, over 40 bushels per acre, are produced by Germany and Great Britain. The world production is about 4,600,000,000 bushels annually. Of this 2,700,000,000 are produced in Europe, Russia being the largest producer in Europe, Germany ranking next, and France third. The oat, although quite free from insect enemies and plant diseases, is subject to rust and loose smut in a way similar to wheat. (See RUST; SMUT.) Early-maturing varieties are usually preferred because they often ripen before rust becomes injurious to the crop, and, on account of being shorter in the straw, they are not so apt to lodge as late varieties. Consult Hunt, *The Cereals in America* (New York, 1904), and *United States Department of Agriculture, Farmers' Bulletins, Nos. 424* and *436* (Washington, 1910–11).

Food and Feeding Value. The oat plant furnishes green forage, hay, and straw, while the ripe grain and its milling products are of great importance as foods and feeding stuffs. The grain has long been used as a food for man, in the United States chiefly as a breakfast food. In the table on page 328 the average percentage composition of some oat products is shown.

Oat forage and hay compare favorably with similar products from the common grasses. (See HAY.) Oat straw contains a higher percentage of crude fibre than the hay, owing to the fact that as the plant ripens the percentage of crude fibre increases. Hay and straw may be fed whole or chopped. The oat grain is rich in protein and carbohydrates and contains a fairly high percentage of fat. It is very valuable for all classes of farm animals, though it is perhaps most commonly thought of as a feeding stuff for horses. It has been claimed that oats contain a peculiar stimulating principle, avenin, to which is due their special value as a horse feed. Careful analysis fails to detect avenin, and the common opinion now is that there is no such substance in the oat. Although the reason is not definitely known, practically all are agreed that horses fed oats excel in mettle and general condition, and it is certain that no feeding stuff is eaten with greater relish. Oats are usually fed unground to horses, grinding being necessary only for foals and for animals whose teeth are not good. New oats should not be fed to work horses, as they cause looseness of the bowels and render the animals liable to sweat easily and put them out of condition. The reason for the bad effects of new oats is not definitely known. For very young pigs oats should be ground and the hulls removed by sieving. For more or less mature pigs and for breeding stock, some oats, either ground or unground, are very desirable.

When oats are low in price they may be profitably fed to sheep for the production of mutton. Like wheat, they induce growth rather than the production of fat. When it is desired to fatten lambs some corn should be fed with the oats. Oats are useful for poultry, ground oats being very valuable as one of the constituents of the morning ration.

AVERAGE COMPOSITION OF A NUMBER OF OAT PRODUCTS

PRODUCTS	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Oat forage	62.2	3.4	1.4	19.3	11.2	2.5
Oat hay	15.0	9.3	2.3	39.0	29.2	5.2
Oat straw	9.2	4.0	2.3	42.4	37.0	5.1
Whole oats	11.0	11.8	5.0	59.7	9.5	3.0
Oat hulls	7.3	3.3	1.0	52.1	29.7	6.7
Oat bran	7.7	7.1	2.3	57.9	19.3	3.7
Oat shorts, middlings, or feed	7.7	16.0	7.1	59.4	6.1	3.7
Oat dust	6.5	13.5	4.8	50.2	18.2	6.9
Oatmeal	7.3	16.1	7.2	66.6	0.9	1.9
Rolled oats	7.7	16.7	7.3	64.9	1.3	2.1

The different milling and by-products obtained from oats resemble the whole grain more or less closely. The hulls represent the loose outer covering of the grain, and the shorts (called also middlings or feed) and the bran consist of the outer layers of the kernels. After the grain is hulled in milling the little tuft of hairs on the end of the kernel is removed. These accumulate and constitute the basis of oat dust. The material, which should also contain some broken kernels, is a useful feeding stuff provided it does not also contain too much mill sweepings. The hulls resemble the straw in composition and are not regarded as an especially valuable feed. The bran and middlings contain a large amount of nutritive material in proportion to their bulk. The oat feeds marketed under various trade names are mixtures of the different oat by-products with or without other materials, and differ in nutritive value, some being much more valuable than others. The average coefficient of digestibility of a number of oat products follows:

COEFFICIENTS OF DIGESTIBILITY OF A NUMBER OF OAT PRODUCTS

PRODUCTS	Total dry matter	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Oat forage	59.5	71.8	69.2	62.6	52.8	53.4
Oat hay	49.3	54.2	61.9	52.0	43.5	34.5
Oat straw	50.3	....	38.3	53.2	57.6	....
Oats whole	72.4	86.1	82.4	79.4	31.1	33.1
Oats ground	75.7	82.4	79.9	86.1	14.4	29.2
Oat feed	62.0	81.1	89.0	67.4	42.6	....

OATES, ōts, Lawrence Edward Grace (1880–1912). An English army officer and Antarctic explorer, educated at Eton. After serving with the militia he was gazetted second lieutenant in the Sixth Inniskilling Dragoons, being promoted to lieutenant (1902) and to captain (1906). He took part in the South African War (1901–02), being severely wounded and receiving the Queen's medal with five clasps. Invalided home, he was appointed adjutant and afterward saw service in Egypt and India. He was a member of the British Antarctic expedition (1910–13) under Capt. Robert F. Scott (q.v.), whom he accompanied on his historic march to the South Pole. During the return journey from the Pole Oates's feet were so badly frozen as seriously to retard his progress. When the sledge party was storm-bound and starving Oates went forth (March 17, 1912) and met death in the blizzard, in order not to detain his comrades. In the vicinity of the spot where he died the research party cut the following inscription on a rude cross, "Hereabouts died a very gallant gentleman."

OATES, Titus (1649–1705). The principal informer in the so-called Popish Plot in England. He was born at Oakham and in 1665 entered the Merchant Taylors' School, but was expelled the first year. After that he went to Sedlescombe School, and from there to Gonville and Caius College, Cambridge, and later to St. John's College. Though he never took a degree he contrived to be ordained, and in 1673 was appointed vicar of Bobbing in Kent. The following year he became curate to his father at All Saints in Hastings, but both were expelled for having invented a scandal concerning a schoolmaster there. Moreover, Titus Oates was thrown into prison. Escaping from prison, he became a chaplain in the navy, but was soon expelled. He now obtained the position of chaplain to the Protestant members of the Duke of Norfolk's household. Here he met a number of Catholic priests and presumably first contrived his plot of informing against Catholics. He associated with himself in 1676 a fellow clergyman, Israel Tonge, and together they planned the various schemes. In order to carry these out Oates pretended to become Catholic, and in 1677 was sent to the Jesuit College at Valladolid and afterward to St. Omer, but from both he was expelled for misconduct, and in 1678 returned to England. Taking advantage of the hostile state of the public mind towards the Catholics, Oates and Tonge in 1678 induced a Lancashire gentleman, Christopher Kirkby, to reveal to the persons interested fictitious details of a plot of Roman Catholics to murder Charles II and make the Duke of York King. Terrible excitement resulted in London, and by the perjured testimony of Oates and his followers about 35 people lost their lives between 1678 and 1681, while Oates himself for a time received a large pension, lived in Whitehall Palace, and enjoyed great favor. Sir Edmund Berry Godfrey (q.v.), who received the depositions, met his end in a way never explained. A reaction set in for Oates and in 1684 he was imprisoned. Upon the accession of James II he was found guilty of perjury and sentenced to be pilloried, whipped, and afterward imprisoned for life. Rather unexpectedly he survived the terrible flogging, and after the Revolution of 1688 was set at liberty. He died July 12, 1705. Consult: John Lingard, *History of England*, vols. ix, x (London, 1855); Gilbert Burnet, *History of my Own Time* (ib., 1883); Thomas Seccombe, "Titus Oates" in *Lives of Twelve Bad Men* (ib., 1894); T. B. Macaulay, *History of England*, vol. i (New York, 1909).

OAT GRASS. A popular name of a number of grasses whose inflorescence somewhat resembles the oat panicles, among them certain species of *Avena*, to which the oat belongs. Various species of *Danthonia* are called oat grass, but are not considered valuable either for hay or for pasture. The best known is the tall oat grass, *Arrhenatherum elatius*, a tufted perennial grass introduced into America from Europe, where it is highly prized for hay. It is common east of the Mississippi River and is grown in the Southern States for hay and winter pasturage. It grows rapidly, resists drought well, and yields a large amount of leafy fodder, especially upon light soils. In some regions upon good soils, if cuttings are made as soon as the grass is in flower or before, three or four cuttings may be made during the season. After flowering it quickly becomes woody and less valuable. Side oats or side oat grass is a name given to species of *Bouteloua*, particularly *Bouteloua racemosa*.

OATH (AS. *āþ*, Goth. *aiþs*, OHG. *eid*, Ger. *Eid*, oath; connected with OIr. *óeth*, oath). A declaration or compact in which the declarant confirms the truth of his assertion by invoking supernatural penalties on his head in the event of perjury. In primitive custom the punishment is often ceremonially represented, as when an animal is sacrificed and the person making a pledge invokes upon himself, if he prove false, the fate of the sacrificial victim. In Aracan, Burma, a native swears on a sword, a crocodile's tooth, or a thunderbolt (stone celt). The implication is that the weapon may slay him, the crocodile devour him, or the god who hurls the lightning smite him. In the Hebrew ritual a sacrificial beast was cut in pieces and burned; the oath taker then passed through the fire, in order to symbolize the fate which should punish his false oath. Quite similar was the ancient Greek usage, in which an animal was slaughtered and the pieces thrown into the sea; or the victim might be burned on the altar; hence it became common to take oaths before altars, where the swearer touched the holy things or raised his eyes and hands to heaven, where was supposed to dwell the deity who watched over the sanctity of compacts. Oaths were usual in the case of every solemn agreement, public or private, relating to business, war, or politics; of this practice survivals remain in our official and judicial custom.

In law an oath is a solemn declaration or pledge made by a person of discretion, before a properly authorized officer, to the effect that a thing stated or promised by him is true, and with some ceremony believed to be binding on the conscience of the declarant, as by an appeal to God to witness his good faith.

With the development of Roman jurisprudence the practice of thus insuring the truthfulness of witnesses in legal actions became fixed and common and continued in the civil law. In England, up to the time of the reign of William and Mary, no one could testify in a court of justice who did not believe in God and recognize the doctrine of future punishment for sins. By the Toleration Act, 1 William and Mary, c. 18, § 13, Quakers, who had conscientious objections to taking an oath, were permitted to make a declaration of fidelity to the state, instead of the oath of allegiance; and by 7 and 8 William and Mary the solemn affirmation of Quakers was made of equal weight with an oath and was allowed in judicial proceedings when the privilege was claimed. In 1854 Parliament passed the Common Law Procedure Act, 17 and 18 Vict., c. 66, § 1, permitting any one whose conscience prevented him from taking an oath, or who did not believe in its binding efficacy, to make a solemn affirmation instead. The Oaths Act, 51 and 52 Vict., c. 46, made further liberal provisions in regard to oaths and affirmations.

With reference to their legal effect oaths are considered assertory, judicial, or extrajudicial. An *assertory* oath is one required by law other than one for use in judicial proceedings, as an oath of office or a revenue or customhouse oath. False swearing in such a case does not amount to perjury, but in most jurisdictions and in the acts of Congress there are statutory provisions making it a crime. A *judicial oath* is one required by law in, or for use in, a judicial proceeding, and a false statement made under such an oath is punishable criminally. An *extrajudicial* oath is one which is voluntarily taken, and not intended for use in a legal proceeding, as an oath taken merely to convince some one in a private transaction of the good faith of the declarant. Its falsity does not constitute a criminal offense.

The most important class of oaths affecting the general public are those which are required to enforce the truth from witnesses in courts and legal proceedings. Where a statute requires an oath to be administered, it is held that only persons having sufficient understanding to know the nature and obligations of such a ceremony may be sworn. Therefore young children and mentally deficient persons who are not able to comprehend the difference between right and wrong are often excluded from testifying in legal actions. In most of the United States a witness may either swear or affirm. False testimony in either case amounts to perjury. An extrajudicial oath is said to be binding only *in foro conscientiæ*, i.e., morally; but it is not legally binding upon the person taking it. An example of such an oath is the common one to abstain from the use of intoxicating liquors.

The statutes of each State prescribe the various officers who shall administer oaths for different purposes. Judges, clerks of courts, referees, justices of the peace, and coroners usually administer oaths to witnesses, and notaries and commissioners of deeds commonly take oaths outside of court for use in judicial proceedings or to authenticate legal instruments. A person authorized to administer oaths cannot delegate his powers, except that where an officer, such as a sheriff, is authorized to appoint a deputy, it is usually held that the deputy represents his principal for all purposes, including the administration of oaths. An oath should be administered strictly in the form prescribed by statute and by a competent officer. For example, it has been held, where a statute prescribed the form of an oath which ended with the words, "so help me God," that the omission of such words would invalidate it. The oath administered to a person subscribing and swearing to an affidavit is usually in the following form: "You do solemnly swear that the contents of this affidavit by you subscribed are true, so help you God." Hebrews are often sworn on the Pentateuch, keeping on their hats, and their oath ends with the words "so help me Jehovah." A Mohammedan is sworn on the Koran; a Chinese witness in the Western States is sometimes sworn by his kneeling, breaking a saucer, and uttering an imprecation that his "soul may be broken into as many pieces as the saucer" if he does not tell the truth. The tendency at present is to consider that the statutes against perjury and false swearing have a more potent effect than religious fears in deterring a witness from making false statements, and accordingly it is not considered of great importance whether a witness swears or affirms that his testimony will be true. Consult the authorities referred to under CRIMINAL LAW; EVIDENCE; PROCEDURE. See ABJURATION; AFFIDAVIT; EVIDENCE; NOTARY PUBLIC; PERJURY; WITNESS.

OATH, CORONATION. See CORONATION.

OATH, HIPPOCRATIC. See HIPPOCRATIC OATH.

OATHS, MILITARY. In the United States army the following form of enlistment contract, duly sworn to, is signed by each recruit on enlistment: "I ———, born in ——— in the State of ———, aged —— years and —— months, and by occupation a ———, do hereby acknowledge to have voluntarily enlisted this —— day of ——— 19—, as a soldier in the Army of the United States of America, for the period of seven years in active service and in the Army Reserve for the periods and under the conditions prescribed by law, unless sooner discharged by proper authority; and do also agree to accept from the United States such bounty, pay, rations, and clothing as are or may be established by law. And I do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; and that I will obey the orders of the President of the United States, and the orders of the officers appointed over me, according to the rules and articles of War." In England all soldiers take a similar oath, swearing fealty, allegiance, and obedience to the King, his heirs, and those placed in authority under him. The most impressive ceremony is that arranged by the German Emperor William II, who follows the custom of the ancient armies and swears in the recruits of the guards regiments en masse. Officers sitting on courts-martial and witnesses testifying are required to take oath or make affirmation. This latter is a rule in all armies throughout the world.

OAXACA, wȧ-hä′kȧ, or **OAJACA.** A Pacific state of Mexico, bounded by the states of Puebla and Vera Cruz on the north, Chiapas on the east, the Pacific Ocean on the south, and Guerrero on the west (Map: Mexico, L 9). Its area is 35,683 square miles. The whole state, with the exception of a low, sandy belt along the coast, is covered with the numerous southern ramifications of the Sierra Madre, inclosing many fertile and beautiful valleys. The slopes are covered with abundant timber and the state is watered by a multitude of streams. The climate is for the most part temperate and healthful. The soil is very fertile and yields abundant crops of sugar, coffee, cacao, tobacco, cotton, and other tropical and semitropical products. Stock raising is also an important industry, but the mineral deposits, though very rich, are but little worked. The state is traversed by two railway lines and has good roads. There is also steamship communication through the ports of Salina Cruz and Puerto Angel. Pop., 1910, 1,040,398. The capital is Oaxaca (q.v.).

OAXACA, OAJACA, or OAXACA DE JUÁREZ. The capital of the State of Oaxaca, Mexico. It is situated in a beautiful valley in the centre of the state, 82 miles from the Pacific coast and 225 miles southeast of Mexico City (Map: Mexico, K 9). It is the chief centre of population in south Mexico, and is well built, with large squares and public parks. The notable buildings and institutions are the government building, the cathedral, the Institute of Arts and Sciences, the public library, and the Museum of Antiquities and Natural History. It is the commercial centre of the state and carries on an active trade, much of which is in the hands of foreigners. It has numerous industries, including the spinning and weaving of the pita fibre and the manufacture of hand-wrought gold and filigree jewelry and green glazed pottery. It is connected by rail with the capital, and with the lines for which concessions have been granted Oaxaca will become an important railway centre of southern Mexico. A United States consular agency is located here. Pop., 1900, 35,049; 1910, 38,011. Oaxaca was founded by the Zapotecs in 1486, under the name of Huaxyacac, and was occupied in 1522 by the Spaniards, who named it Antequera. Benito Juárez was born here.

OAXACA, RUINS OF. Enormous works of the ancient Mexicans near the city of Oaxaca. The whole range of Monte Alban as seen in profile gives evidence of artificial modification. On ascending the summits one is amazed at the display of pyramids, terraces, quadrangles, and mounds covering every available space, and one finds that the whole mountain has been remodeled by the hand of man at cost of immense labor. The greatest of these works is located on the summit of Monte Alban at 1000 feet elevation, and covers an area of 3400 by 1200 feet, sculptured into a vast series of level courts inclosed by successive terraces and bordered by pyramids. The quadrangles are flanked at the corners by pyramids, and in the centre is a mound, the ruins probably of a temple. One of these pyramids is 400 feet square and rises 40 feet to the summit, which is 300 feet square. Another court, or plaza, is a level, sunken field 600 feet wide and 1000 feet long, inclosed by pyramids and terraces and having a line of four pyramids ranged along its centre. In the absence of suitable building stone at Monte Alban, the builders employed cores made up of small stones and adobe faced usually with small rough blocks, but sometimes with dressed masonry, and covered with cement on the exterior. There is no evidence that the surface was finished in fresco as at Mitla. Cement floors may also be observed in the ruins, and there are traces of strong walls. Many interesting sculptures have been found recently in the ruins, some of which served as facings for the lower part of the pyramidal foundations of temples. A number of hieroglyphic inscriptions of the Zapotecan type and a stela carved on the four sides with figures and hieroglyphs were uncovered at the same time. A notable find was a beautifully decorated vessel partly filled with carved ornaments of jadeite; the vessel and the jadeite are of the Mayan type. The pottery scattered on the surface and in the débris is of slate color like the ware sold in Oaxaca market. The makers of the old ware decorated their vessels with raised ornaments and modeling. Innumerable small amulets of jadeite and other hard stone in form of a rudely carved human figure are found. These objects show drilling, sawing, and other methods of stoneworking. A few gold and copper objects have been taken from the ruins.

Prof. W. H. Holmes, who made a careful examination of Monte Alban in 1896, concludes that we have there the remains of a hilltop city occupied by a population which utilized for their crops the rich valley in which Oaxaca stands, and covered the mountain slopes with their garden plots. The American Museum of Natural History has carried on extensive excavations in the valley of Oaxaca, and possesses a valuable collection of antiquities illustrating the Zapotecan culture. The local museum at Oaxaca contains a large collection of archæological objects from Monte Alban and other ruins in the state. In point of age the Monte Alban ruins certainly precede those of Mitla, and it seems likely that this great city flourished some time after the sixth century A.D. There is no record of its having been occupied at the time of the Spanish conquest.

Consult: H. H. Bancroft, *Native Races of the Pacific States*, vol. iv (New York, 1875); A. F. A. Bandelier, *Report on Archæological Tour in Mexico* (Boston, 1885); W. H. Holmes, *Archæological Studies among the Ancient Cities of Mexico* (Chicago, 1897); M. H. Saville, *Exploration of Zapotecan Tombs in Southern Mexico* (Washington, 1899).

OB. A river of Siberia. See Obi.

OBACH CELL. See Voltaic Cell.

O'BADI'AH (Heb. *'Obadyāh*). The author of the fourth book of the Minor Prophets according to the arrangement in the Jewish canon, and the shortest book of the Old Testament. Concerning Obadiah nothing is known; it may even be that the name is a mere symbol, chosen on account of its meaning—"servant of Yahwe" (cf. Malachi, "my messenger"). The book consists mainly (verses 1–15) of a prophecy of the destruction of Edom for abetting the destruction of Jerusalem. The Edomites are to be driven out of Mount Seir. This oracle, which is an ode of triumph over Edom, must be later than 586 B.C., and internal evidence is in favor of a period much later, though it must be older than 312 B.C., when Petra was in the hands of the Nabatæans. A peculiar problem in the case of Obad. 1–15 is presented by the similarity of verses 1–10 to Jer. xlix. 7–22. It appears certain that one of these passages is dependent upon the other or that both are dependent upon a common source. Perhaps the more probable view is that Jer. xlix. 7–22, which is widely recognized as a late addition to the book, is dependent upon Obadiah. Verses 16–26 present this judgment as still in the future and bring it into connection with a general judgment. This appears to some scholars to be an appendix to the book added in the Maccabæan period. Consult: the works mentioned under Minor Prophets, especially the commentaries by Julius Wellhausen (3d ed., 1898), G. A. Smith (1898), Nowack (2d ed., 1903), Marti (1904), S. R. Driver in *Century Bible* (1906), Van Hoonacker (1908); Caspari, *Der Prophet Obadja ausgelegt* (Leipzig, 1842); Winckler, in *Alttestamentliche Untersuchungen*, part iii (ib., 1892); Perowne, "Obadiah and Jonah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1882); Peters, *Die Prophetie Obadias* (Paderborn, 1892); Haller, in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913).

OBAL'DIA, José Domingo (1845–1910). A President of Panama, born at David, Province of Chiriqui, the son of the former President of Colombia. He was educated in the College of Bogotá, was for a time in the service of the Panama Railway, and later spent two years studying in the United States. Returning to Panama, he gave his attention to stock raising and agriculture and accumulated a considerable fortune. He was elected to the Colombian Congress (1900) and in 1903 was chosen Senator, in which capacity he was the only member who voted in favor of the ratification of the Hay-Herran Treaty. After the failure of the treaty, Obaldia resigned from the Senate and soon afterward was appointed Governor of the Province of Panama. He joined in the revolution of 1903, which achieved the independence of Panama, and was made Second Vice President of the new Republic. Later he was Minister to the United States, where as a member of the governing board of the Pan-American Union he labored in behalf of the cause of Pan-Americanism. In 1906 he was elected First Vice President and two years later was chosen President, being the candidate of the Liberal party. He endeavored to give the country a good administration and had served 17 months of his term when he died.

OBAN, ō'ban. A seaport, municipal and police burgh, and fashionable watering place in Argyllshire, Scotland, on the Bay of Oban, an arm of the Firth of Lorne, 20 miles northwest of Inveraray (Map: Scotland, C 3). The bay, protected by the island of Kerrera on the west and by the high shores of the mainland, has the appearance of a lake. Oban is the great rendezvous for tourists in the west Highlands. The exports are whisky and sheep products. Pop., 1901, 5427; 1911, 5557.

OBANDO, ō-bän'dō, José María (1797–1861). A Colombian general and statesman, born near Popayán. He entered the Spanish army, but in 1822 joined the revolutionists and rendered valiant service to the cause of independence. He opposed the dictatorship of Bolívar in 1828 and headed a Liberal revolt against the dictatorship of Urdaneta, defeating the Dictator at Palmira (1831). Obando then established a constitutional government for the Republic of New Granada, was named Secretary of War, and was elected Vice President by Congress (1831). He led a rebellion against Marquez (1838–41), but was defeated and exiled until his party was restored to power in 1849. He was elected President in 1853, but in the following year was overthrown and exiled. He was recalled in 1860 to aid in the defense of the federation against the revolutionists and was killed at Cruz Verde.

OBBLIGATO, ôb′blê-gä′tô (It., bound, compelled). A term in music signifying that the instrumental part so marked is absolutely necessary to the performance of the composition and cannot be omitted. The word is especially applied to an instrumental accompaniment to a vocal solo.

ÓBECSE, ŏ′bĕch′ĕ. A town of Hungary. See Becse.

OBE′DIENCE (Lat. *obœdientia*, from *obœdire*, *obedire*, to obey, from *ob*, before + *audire*, to *hear*). In canon law, the duty by which the various gradations in ecclesiastical organization are held subject to the several superiors placed immediately above each, respectively, in the hierarchical scale. Thus, priests and inferior clergy owe canonical obedience to the bishop, and priests are bound thereto by a solemn promise administered at ordination. The bishop primitively took a similar oath to the metropolitan, but by the modern law the jurisdiction of the metropolitan is confined to the occasions of his holding a visitation or presiding in the provincial synod. Bishops, by the present law of the Roman Catholic church, take an oath of obedience to the Pope. This obedience, however, is strictly limited by the canons and is only held to bind in things consistent with the divine and natural law. In ecclesiastical history the word "obedience" has a special signification and is applied to the several parties in the Church which, during the great Western schism, adhered to the rival popes. Applied to the monastic institute, obedience means the voluntary submission which all members of religious orders vow, at the religious profession, to their immediate superiors, of whatever grade in the order, as well as to the superior general, and still more to the rules and constitutions of the order. This forms, in all orders, one of the essential vows. It is, however, expressly confined to lawful things. The name "obedience" is sometimes given to the written precept or other formal instrument by which a superior in a religious order communicates to one of his subjects any special precept or instruction, as e.g., to undertake a certain office, to proceed upon a particular mission, to relinquish a certain appointment, etc. The instruction, or the instrument containing it, is called an obedience, because it is held to bind in virtue of religious obedience.

OB′ELISK (Lat. *obeliscus*, from Gk. *ὀβελίσκος*, *obeliskos*, spit, pointed pillar, dim. of *ὀβελός*, *obelos*, spit, pointed pillar). A word applied to prismatic monuments of stone terminating in a pyramidal top. In Arabic they are called *messellah* (pack needle). The ancient Egyptians called them *tekhen*, a name of unknown etymology, and stated that they were dedicated to the sun god; they were therefore most numerous in the sacred city Heliopolis, whence most existing obelisks come. As most Egyptian gods were sooner or later identified with the sun, it eventually became appropriate to place obelisks at the entrance of every temple; even Isis had, in Ptolemaic times, two obelisks before her temple in Philæ. We first meet small private obelisks in the time of the pyramid builders; in the fifth dynasty some gigantic monuments, half obelisk, half pyramid, which were also dedicated to the sun god, seem to be an attempt to develop the obelisk into larger proportions by sacrificing the monolithic principle. The pairs of obelisks flanking the entrances of temples were always monoliths, usually of granite from Syene (Assuan). From unfinished specimens in these quarries we can form an opinion of the way in which they were roughly separated from the rock, by means of borings and moistened wooden pegs. How these gigantic monuments were, during the inundation, transported by water on rafts or specially constructed boats is depicted in a relief at Deir el Bahri, reproduced in the *Archæological Report of the Egypt Exploration Fund* for 1895–96; unfortunately, in regard to the machinery used for erecting them we know nothing. Judging from the difficulties experienced by mediæval and even modern engineers in transporting and erecting them, it is difficult to conceive how the ancient Egyptians, with the simple apparatus at their disposal, could handle these great blocks of a hundred and more feet in length. One of the tallest obelisks—that of Queen Hat-shepsut (Hatasu) at Karnak—is estimated at 97½ feet in length, its diameter at the base is 8½ feet, its mass is estimated at 4873 cubic feet and its weight at 367 tons. The inscriptions state that this obelisk, together with its companion, was cut in 7 and finished in 19 months. Inscriptions mention still taller obelisks. All obelisks have four faces and are broader at the base than at the top; the pyramidion or cap on the top is sometimes round. The pyramidion was often covered with metal (brass or gold), as were also the hieroglyphic inscriptions running down the sides of the obelisk. The pyramidion frequently contained more elaborate sculptures than the obelisk itself. These sculptures merely represent the King engaged in worshiping and making offerings before the god; the inscriptions also are always of a very simple character, containing nothing more than the titles and praises of the dedicating King. The obelisk always stood on a cubical pedestal, slightly broader than the base of the obelisk, and on this pedestal significant ornaments were sometimes sculptured. For example, on the pedestal of an obelisk in Karnak may be seen the cynocephali worshiping the rising sun. In later times the Romans put decorations on the top, like brazen spheres.

The earliest obelisk yet standing is that of Heliopolis (modern Matarieh), erected by Usertesen I (the second King of the twelfth dynasty) before the sun temple; another of the twelfth dynasty is the fallen obelisk of Begig in the Fayum. In Karnak, of two obelisks of Thothmes I one is still standing, 76 feet high. Obelisks of Thothmes III were specially numerous. One was removed in antiquity to Constantinople (now in the Atmeidan or Hippodrome); it is only the upper part of an obelisk originally much over 100 feet in height. Another is that of St. John of the Lateran at Rome, now 106 to 107 feet high. The two famous needles of Cleopatra were first erected by Thothmes III at Heliopolis, and were, in Ptolemaic times, transported to Alexandria. One came thence to London in 1878 (now on the Thames Embankment), the other to New York by the ship *Dessoug*, under the direction of Lieutenant Commander Gorringe, U. S. N., at the expense of William H. Vanderbilt, in 1880 (erected in Central Park, Feb. 22, 1881). Both these monuments were richly reornamented by Ramses II. The Paris obelisk, whose companion still stands at Luxor, dates from the time of Ramses II. It was removed in 1831 and erected in the Place de la Concorde in 1833. The Flaminian obelisk is the work of Ramses II, though his father, Seti I, commenced it. It was removed to Rome by Constantius, and in the pontificate of Gregory XIII it was found 16 feet under the surface of the earth. The architect Fontana reërected it under Sixtus V with great difficulty. Of the numerous obelisks brought to Rome that of the Monte Citorio (brought to Rome by Augustus, rediscovered in 1748) dates from the twenty-sixth dynasty, having been sculptured by Psammetichus II. Two obelisks in the British Museum bear inscriptions of Nekht-har-heb of the fourth century B.C.; others from the reign of Ptolemy VIII once stood before the temple of Philæ. These monuments were so popular at Rome that the emperors had several of them cut; e.g., the Pamphilian obelisk, erected by Bernin, in 1651, in the Piazza Navona, was originally erected before the Serapeum at Rome by Domitian, whose name it bears; thence it was removed to the circus of Maxentius. The Barberini obelisk originally stood before the mausoleum (?or cenotaph) of Antinous, the favorite of Hadrian, whose death it commemorates. It was found in the circus of Aurelian in 1633 and was erected on the Monte Pincio in 1822. The Sallustian obelisk and that of Beneventum belong to the same period. In modern Rome obelisks are always used as ornaments in the centre of public places, sometimes near a fountain, and often with the addition of Renaissance ornaments.

In Assyria several monuments have been found which are called obelisks, although they bear but a slight resemblance to those of Egypt, being merely stelæ in the shape of truncated, slanting prisms, with step-shaped apices. The most remarkable is the black obelisk of Shalmaneser II, covered with long inscriptions recording the victories of this King and representations of the tributes brought to him, among them the tribute bearers of King Jehu of Israel (842 B.C.). A broken obelisk of Asurnazirpal (885–860 B.C.) is the next in importance; then one of Shamsiramman (825–812 B.C.).

The term "obelisk" is also commonly applied to any monolithic stele or upright stone resembling an obelisk in form, whether used as sepulchral monument and therefore quite properly designated as an obelisk, or as a mere finial or ornament, as on German gables or Italian balustrades on corner pedestals. The Bunker Hill and Washington monuments, though obelisks in shape, are not true obelisks, not being monolithic.

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OBER, ō′bẽr, FREDERICK ALBION (1849–1913). An American traveler and author, born in Beverly, Mass., and educated at the Massachusetts Agricultural College. He traveled and hunted birds in the West Indies (1876–80) and visited Mexico, Spain, north Africa, and South America. He wrote travels, historical sketches, and novels, including *Camps in the Caribbees* (1879); *The Silver City* (1882); *Travels in Mexico* (1883); *Porto Rico and its Resources* (1892); *Josephine, Empress of the French* (1895); *History of the West Indies* (1900); *The Cacique's Treasure Cave* (1901); *The Last of the Arrawaks* (1901); *Tommy Foster's Adventures* (1901); *Hernando Cortés, Conqueror of Mexico* (1905); *Fighting for the Isthmus* (1905); *Pizarro and the Conquest of Peru* (1906); *Heroes of American History* (12 vols., 1907); *A Guide to the West Indies and Bermudas* (1908; rev. ed., 1914).

OBERAMMERGAU, ō′bẽr-äm′mẽr-gou. A village in Upper Bavaria, Germany, noted for the celebration of the Passion Play (q.v.).

OBERDIECK, ō′bẽr-dēk, JOHANN GEORG KONRAD (1794–1880). A German pomologist, born at Wilkenburg, near Hanover. He studied theology at Göttingen and entered the ministry in 1819, holding various charges until his death. His leisure hours he devoted to the improvement of German orchards. He made a great collection of fruit trees and in 1855 became editor of the *Pomologische Monatshefte*. Among his publications the more important are: *Die Probe- oder Sortenbäume* (1844; 2d ed., 1871); *Illustriertes Handbuch der Obstkunde* (9 vols., 1858–79), with Lucas and Jahn; *Deutschlands beste Obstsorten* (1881). Consult his *Kurzer Abriss meines Lebens* (Stuttgart, 1870).

OBERGE, ô-bẽr′*ge*, EILHARD VON. A German poet of the close of the twelfth century. Eilhard wrote, from French sources, the first German version of *Tristan und Isolde*. Of his own work there now exist a few fragments published by Steinmeyer in *Zeitschrift für deutsches Altertum*, vol. xxi, pp. 320 et seq., a complete revision dating a century later, based on English or French originals, another version in prose (1484), and a Bohemian translation. Lichtenstein edited the remains of the work in German verse (Hamburg, 1877), and Pfaff the prose romance of the fifteenth century (Stuttgart, 1881). Consult Lichtenstein, *Quellen und Forschungen, No. 19* (Strassburg, 1878).

OBERHAUSEN, ō′bẽr-hou′*zen*. An important manufacturing town in the Rhine Province, Prussia, situated near the right bank of the Rhine, 35 miles north of Cologne. It has extensive iron foundries, rolling mills, railway shops, chemical works, and manufactures of various iron and tin wares, soap, chemicals, wire rope, lumber, porcelain, wire, glass, and flour. In the vicinity are important coal, zinc, and iron mines, and coke ovens. Pop., 1900, 42,148; 1910, 89,900.

OBERHOFFER, ō′bẽr-hôf′ẽr, EMIL (1867–). An American orchestral conductor, born near Munich. He received his first instruction from his father, who was an excellent organist. His progress was so rapid that at 10 he was quite remarkable both as a violinist and as an organist. While studying at the Gymnasium he continued his musical education with Cyril

Kistler (piano and composition). Later he went to Paris to study piano under Isidore Philip. When he came to America he remained a short time in New York, but soon settled in St. Paul as conductor of the Apollo Club. In 1901 he directed the Philharmonic Club in Minneapolis, and immediately began to work for the organization and endowment of a permanent orchestra. His efforts resulted in the establishment of the Minneapolis Symphony Orchestra (1903), which under his direction came to be one of the foremost instrumental bodies in the United States. In addition to this work Oberhoffer accepted the chair of music at the University of Minnesota.

OBERHOLTZER, ō'bēr-hōlt'sēr, Ellis Paxson (1868–). An American biographer and historical writer, born in Philadelphia. He was educated at the University of Pennsylvania (Ph.D., 1893) and at German universities. For a number of years he was engaged in newspaper work and magazine writing; he edited the American Crisis Biographies and in 1908 and 1912 directed historical pageants at Philadelphia. He is author of *The Referendum in America* (1893; new ed., 1900; rev. ed., 1911); *Die Beziehungen zwischen dem Staat und der Zeitungspresse im deutschen Reich* (1895); *The New Man* (1897); *Robert Morris, Patriot and Financier* (1903); *Abraham Lincoln* (1904); *The Literary History of Philadelphia* (1906); *Jay Cooke, the Financier of the Civil War* (2 vols., 1907); *Henry Clay* (1909), with T. H. Clay; *Philadelphia: A History of the City and its People* (4 vols., 1912).

OBERHUMMER, ō'bēr-hụm'ēr, Eugen (1859–). A German geographer, born and educated at Munich (Ph.D., 1882). He traveled in Europe, Egypt, Turkey, and North America and became privatdocent at the University of Munich (1886), assistant professor of geography there (1892), and professor of historical-political geography at the University of Vienna (1903). He was exchange professor at Columbia University in 1914–15, and the representative of his country on the International Polar Commission. His publications include: *Phönizier in Akarnanien* (1882); *Akarnanien, Ambrakia, Amphilochien, Leukas in Altertum* (1887); *Konstantinopel unter Sultan Suleiman dem Grossen* (1902); *Die Insel Cypern: eine Landeskunde auf historischer Grundlage* (1903), awarded the Bavarian Academy prize; *Wolfgang Lazius* (1906); *Eine Reise nach Griechenland* (1912); and maps of Austria-Hungary, a jubilee publication of the Vienna Geographical Society, of which Oberhummer became president.

OBERLÄNDER, ō'bēr-lĕn'dēr, Adolf (1845–). A German caricaturist and painter, born at Regensburg. He studied painting in Munich at the Academy and under Piloty, but found his true field in humorous productions and began in 1863 to contribute to the *Fliegende Blätter*. These satirical drawings soon made his name familiar in every part of the world whither that publication has made its way, and placed him among the foremost of the humorists in art. Some of the best of his work for the *Fliegende Blätter* is collected in the *Oberländer-Album* (Munich, 1879–1901). His subjects are taken from the life of the middle classes, from mythology, fairy lore, and the animal world, and all his work combines a finished talent as a draftsman with deep psychological insight and satirical humor. Also a painter of some distinction, he is represented in the galleries of Berlin, Dresden, Munich, and other cities. Consult the monograph by Klein (Berlin, 1910), and Whibley, in *Art Journal* (London, 1889).

OBERLEUTENSDORF, ō'bēr-loi'tens-dôrf. A town in the Crownland of Bohemia, Austria, 32 miles south of Dresden. It has a church built in 1690 by the Archbishop of Prague and a castle dating from 1732. Its principal manufactures are furniture, toys, hats, and woolens; some coal is mined in the region. Pop., 1910 (arrondissement), 35,053.

OBERLIN, ō'bēr-lĭn. A village in Lorain Co., Ohio, 33 miles west by south of Cleveland, on the Lake Shore and Michigan Southern Railroad (Map: Ohio, F 3). There are some local industries, but the village is noted chiefly as the seat of Oberlin College (q.v.). Settled in 1833, upon the establishment of the college, Oberlin was first incorporated in 1846. The government is vested in a mayor, elected every two years, and a unicameral council, chosen on a general ticket. The village owns and operates the water works. Pop., 1900, 4082; 1910, 4365.

OBERLIN, ō'bâr'lăN', Jean Frédéric (1740–1826). An Alsatian Lutheran clergyman and philanthropist. He was born at Strassburg and studied at the Gymnasium and university of his native city. In 1766 he was appointed chaplain in the French army, but before entering upon his duties accepted a call to go as pastor to Ban-de-la-Roche (Steinthal, stony valley), on the borders of Alsace and Lorraine. During the 60 years of his ministry at this place Oberlin wrought great changes in the character and condition of the people. He gave special attention to their material welfare, himself leading in the work of building roads and bridges. He introduced improved agricultural methods, sent some of the more intelligent young men to Strassburg to learn trades, and opened schools. He also put to practical use a knowledge of medicine he had gained while tutor in a physician's family, and he founded a bank for lending money without interest or security. The government he established was of the purest patriarchal form. Yet, being an enemy of the aristocracy and clergy, he looked with favor on the French Revolution. The Steinthal became an asylum of refuge for many who fled to escape scenes of violence elsewhere. Three Sabbaths a month he preached in French, the fourth in German. Outside his little canton he found admiring friends. Oberlin, Ohio, was named for him. His collected writings were published in four volumes (Stuttgart, 1843). His life was written by Ströber (Strassburg, 1831); Bodemann (Stuttgart, 1855; 3d ed., 1879); Hackenschmidt (Strassburg, 1902); and in English by Josephine Butler (London, 1882) and A. F. Beard (Boston, 1909).

OBERLIN (ō'bēr-lĭn) **COLLEGE**. A coeducational institution for higher education founded in 1833 in Oberlin, Ohio. It was chartered as Oberlin Collegiate Institute and the present name was not adopted until 1850. The college was in operation in 1834, although the preparatory school had been open prior to that time, and the theological seminary in 1835. In 1867 the conservatory of music was organized as a department of the college. Oberlin College was among the first institutions of higher learning to admit colored students and was in general a stronghold of the antislavery spirit. It was also a pioneer in coeducation, having in 1841 granted the degree of A.B. to women as well as to men. The requirement of admission to the university or conservatory is 15 credits; to the seminary, graduation from an acceptable college. Oberlin College was on the original list of beneficiaries of the Carnegie Foundation for the Advancement of Teaching. In 1914–15 the enrollment in all departments was 1607; the faculty consisted of 126. In 1914 the college received from Dr. W. P. Allen and J. L. Severance, of Cleveland, $50,000 towards a new art building, $25,000 from C. W. Paul and F. N. Finney for a new pipe organ in the college chapel, and $25,000 from C. M. Hall for campus improvements. The productive funds amount to about $2,600,000 and the annual income to about $395,000. The total value of college property in 1915 was $4,207,000. The library contains about 145,000 bound volumes and 130,000 pamphlets. The president in 1915 was Henry C. King, D.D.

OBERLIN THEOLOGY. The system of doctrines taught at Oberlin College in its first period by Charles G. Finney (q.v.) and his colleagues. Finney had early come by his own thought to embrace the general system of theology taught by the leading Congregationalists of his time, and known as New School Calvinism. (See NEW ENGLAND THEOLOGY.) Although it is difficult to establish any direct connection of Finney with New Haven, it is true that the most striking similarity exists between his views and those of N. W. Taylor (q.v.), even in details. The system is Calvinism modified by the doctrines of the freedom of the will and of benevolence as the essence of virtue. Sin is conceived as strictly personal to the sinner, and therefore all imputation, whether of Adam's sin or of Christ's righteousness, is denied. Original sin becomes native tendency to evil resulting in actual sin in the case of every man. Regeneration is the act of the Holy Spirit persuading the soul to the choice of the good, which choice is conversion. Great emphasis is laid upon the divine moral government, and the theory of the atonement taught is the governmental. After Finney arrived in Oberlin (1835) the theory of the simplicity of moral action (which had been taught by Emmons) was revived and made the basis of a somewhat new view of sanctification. A volition, it was said, is indivisible in its nature and must be either right or wrong. In any moment, as having but one act of choice at that moment, the soul is, therefore, either entirely holy or entirely sinful. The ability of man to obey the law of God is complete, for his obligation cannot exceed his ability. Therefore at any moment a man may perfectly and wholly obey the law, and is therefore at that moment perfectly sanctified. If he will only continue thus to choose the right uninterruptedly (which he is able to do in consequence of the freedom of his will), he will maintain a sinless life. Since he can do this, he ought to do it. Hence sinless perfection is both obligatory upon the Christian and possible. To attain this the aid of the Holy Spirit was to be sought in prayer. This theory, in connection with the great practical earnestness of the Oberlin colony and their conviction of their call to effect large things in the extension of Christ's kingdom, led to efforts and professions in the attainment of holiness which were in time largely modified, but which were at first the occasion of great suspicion and opposition. The peculiarities of Oberlin were greatly exaggerated; but what peculiarities there were have largely passed away with the progress of time. Consult C. G. Finney, *Systematic Theology* (Oberlin, 1847; new ed., 1878), and F. H. Foster, *Genetic History of New England Theology* (Chicago, 1907).

O'BERON. In West European folklore, the king of the elves or fairies and the husband of Titania. Oberon is first mentioned as *roi du royaume de la feerie* in the old French poem of *Huon de Bordeaux* (thirteenth century), which was in 1454 made the basis of a popular prose romance. This romance was translated into English by Lord Berners about 1530 (printed in 1534). From this beautiful version Shakespeare must have derived the Oberon and Titania of *A Midsummer Night's Dream.* Chaucer, Greene, and Spenser adopted Oberon. Wieland got the idea of his *Oberon* (1780) from the *Bibliothèque universelle des romans,* published in 1775. Using Wieland, Planché worked up his text for Weber's opera *Oberon.* The mediæval French poem done into modern French by Gaston Paris was edited by Guessard and Grandmaison (Paris, 1860), and Lord Berners's version by Lee for the Early English Text Society (London, 1883–85).

OBERON. An opera by Weber (q.v.), first produced at London, April 12, 1826; in the United States, Oct. 9, 1827 (New York).

OBERON. A satellite of Uranus. See URANUS.

OBES'ITY (Lat. *obesitas,* from *obesus,* fat. p.p. of *obedere,* to eat up, from *ob,* before, near + *edere,* to eat), CORPULENCE, or POLYSARCIA. An abnormal deposit of fat under the skin and around the viscera. The amount of fat possessed by an individual may vary widely within the limits of health, but so long as it does not interfere with the bodily functions or movements it is not pathological; indeed, a certain quantity is useful and necessary to protect the various organs and to maintain their temperature, as well as to serve as a reserve supply of nutrition. (See FATS.) The normal proportion of fat to the whole body weight is given as about one-fifteenth to one-twentieth. Obesity may occur at any period of life, but the tendency to corpulence is greatest after 40. In women the predisposition is greatest after the first years of childbearing, and again after the menopause. In the production of obesity three great causes are active as a rule. These are heredity, overindulgence in food and drink, and lack of exercise. Most persons over 40 eat too much and exercise too little. Alcohol tends to fatten by substituting itself for food in the oxidizing process. Fat when once deposited favors the deposition of more fat, for by acting as a nonconducting envelope to the body it prevents the radiation of heat, and so decreases the combustion of those substances which when not used to produce heat are stored up as fat. The immediate cause of obesity is generally a faulty assimilation due to some digestive derangement by which oxidation of the albuminous elements of the food is interfered with. The carbohydrates are not, as was long thought, *directly* to blame, since they are readily converted into carbon dioxide and water. On account, however, of the ease with which the carbohydrates are oxidized, the albuminous elements of the food undergo incomplete oxidation, are not so fully decomposed, and the fat is in reality derived from them. The fatty portions of the food are not so prone to cause undue deposition of fat as are the carbohydrates, since they interfere less with the conversion of the nitrogenous elements and are less easily oxidized.

The symptoms which may attend extreme degrees of corpulence are a falling off of mental and physical activity, shortness of breath on the least exertion, and impairment of the functions of respiration, circulation, and digestion, together with anæmia and muscular weakness. This, however, is an extreme picture. It is a matter of daily observation that obesity is compatible with a high degree of mental and physical alertness and general good health. Nevertheless corpulence must be regarded as a pathological state. Subjects of it are prone to contract heart disease and die from sudden cardiac dilatation. They are also liable to such diseases as asthma, apoplexy, diabetes, gallstones, gout, etc., and they are likely to succumb when attacked by acute infections.

Many plans of treatment, based on systems of exercise and diet, have been advocated for the reduction of fat, the most notable being those of Banting, Ebstein, and Oertel. All of these systems have for their object the regulation of exercise in such a way that oxidation may proceed in a normal manner, and regulation of the diet so that a less quantity than normal of the fat-producing elements is taken in. This object is attained in various ways. In the method of Banting (1797–1878) the total quantity of food is reduced, the liquids restricted, and the fats and carbohydrates excluded. Ebstein's (1836–1912) method permits the use of fats, but eliminates the carbohydrates. Oertel's (1835–97) system is especially intended for individuals with cardiac complications, and consists of three parts: first, the reduction of liquids, with promotion, by baths or other means, of perspiration; second, restriction of the diet largely to proteid substances; and third, the taking of graduated exercises in walking up hill. Thyroid extract enjoyed for a time a reputation as a fat reducer, but its tendency to interference with the heart, which is apt to be weak in obese persons, makes it a somewhat dangerous drug. Among other substances which have been used for this purpose are iodine, bromine, mercury, lead, arsenic, lemon juice, sour wines, vinegar, phytolacca, gulfweed, and bladder wrack. Many of these, while having an influence on the fat, act as slow poisons and damage the assimilative organs, so that their ultimate effect is injurious. The application of electric currents, which produce fine but rapid muscular contractions, has been credited with reducing corpulence with great rapidity; and to individuals with unwieldy, pendulous abdomens surgery offers a relief which consists in removing a thick layer of fat from the abdominal wall.

Adiposis dolorosa, also known as Dercum's disease, after the Philadelphia neurologist who first described it, is a chronic and painful malady, characterized by the deposition of masses of fat irregularly through the body with the exception of the hands and feet. These accumulations are tender to the touch, and the disease is thought to be essentially a neuritis. Disturbances of the thyroid gland or pituitary body appears to play a rôle in the etiology. There may also be disturbances of sensation (hyperæsthesia or anæsthesia) in different areas of the skin, together with mental and muscular weakness. No efficacious treatment is known, but thyroid feeding has been suggested.

OBI, ō'bē, or **OB**. The westernmost of the great rivers of Siberia (Map: Asia, H 2). It rises in the Altai Mountains and flows northwest, then north through the Siberian governments of Tomsk and Tobolsk, emptying into the Arctic Ocean through an immense estuary, the Gulf of Obi, which is 600 miles long and 60 miles in average width. The length of the river itself above the estuary is about 2500 miles, and it is nearly 2 miles wide at its mouth. After emerging from the foothills of the Altai range the river flows for the remainder of its course through an almost perfectly level country consisting first of sandy steppes, then of rich tracts of fertile soil, and finally of vast marshes. In its lower course it divides repeatedly into parallel arms connected by cross-channels, forming a network of islands, which during floods are submerged under sheets of water many miles wide. Although not yet extensively used as a waterway, the Obi with its tributaries presents a total navigable length of over 9000 miles. In summer the main river and all its larger tributaries are navigable almost to their sources, and during the spring floods many secondary tributaries can be ascended by light-draft steamers. By means of the Irtysh, Tobol, and Tura it is connected with the Volga waterway, and by the Ket and canal with the Yenisei. The river is icebound near its mouth from October to June. Of its numerous tributaries the largest is the Irtysh (q.v.), which is considerably longer than the main stream from the point of confluence. The Siberian Railway crosses the Obi south of the city of Tomsk.

OBIS'PO (Sp., bishop). A Cuban name of the spotted sting ray (*Aëtobatus narinari*). It is one of the eagle rays, and is brown in color, with small, round, pale spots.

O'BIT (OF. *obit*, from Lat. *obitus*, death, approach, from *obire*, to meet, from *ob*, towards + *ire*, to go). Literally, the decease of an individual. But as a certain ecclesiastical service was fixed to be celebrated on the day of death (*in die obitus*), the name can be applied to the service itself. Obit therefore signifies, in old Church language, the service performed for the departed. It consisted, in the Roman church, of matins and lauds, followed by a mass for the dead.

OB'ITER DIC'TUM. See DICTUM.

OBJECT GLASS. The lens in a telescope (q.v.) or microscope (q.v.), which is placed at the end of the tube nearest the object and first receives the rays of light.

OBJECT TEACHING. A mode of teaching in which objects are made the studies of young pupils. By this method a systematic attempt is made to exercise and train the senses of the child. But while this was the essential feature of the method, it owes its importance far more to the emphasis that was placed on the inductive method and on the recognition that the development of a child must proceed on a concrete basis and begin with his immediate environment. In other words, object teaching has its value both as an end and as a means. It may be noted that its development followed soon after the advocacy of the inductive method by Bacon and was revived again by Rousseau's statement that education must start with the child's own experience. Comenius (q.v.) in the *Great Didactic* writes: "Let the senses be applied to the subject as often as possible, e.g., let hearing be joined with vision and the hand with speech. It is not enough to apply to the ears, but the teacher must present to the eyes, that through them instruction may reach the imagination. Leave nothing till it has been impressed by means of the ear, the eye, the tongue, the hand." His *Orbis Pictus* was the first schoolbook in which pictures were used to illustrate the various topics. In the work of Comenius, therefore, is to be found the first clear presentation of the principles of object teaching. To Pestalozzi (q.v.), however, may with justice be given the credit of introducing the method as a special feature of primary education. Since Pestalozzi all educators have agreed that the child's activity, manifested through the senses, should be directed to the things about him. In this way, (1) the child's senses are trained, (2) his judgment is aroused, and (3) he acquires language. The three must go together. Pestalozzi saw that in order to reach clear knowledge of anything the mind must pass through a necessary sequence of processes. From sense perception it must rise through ideation to clear concepts. Mere presentation of objects is not sufficient. There must be the inner reaction of the learner. There must be, therefore, (1) the sense material, (2) the inner reaction of mind, (3) the word. Object teaching received its greatest extension in England under the influence of Rev. Charles May and the Home and Colonial School Society (1836). Many elementary textbooks on objects were published. The spread of the Pestalozzian movement in America brought with it an interest in object teaching which is especially associated with the Oswego movement, of which the Oswego, N. Y., Normal School under Edward A. Sheldon was the centre. Further applications of object teaching to the teaching of elementary science were made in St. Louis under W. T. Harris, and directly influenced elementary school work throughout the country. Consult Barnard, *Object Teaching* (New York, 1860), and Calkins, *Manual of Object Teaching* (ib., 1890). See KINDERGARTEN; NATURE STUDY; PEDAGOGY.

OBLATES, ŏb′lāts (ML. *oblatus*, oblate, from Lat. *oblatus*, offered, p.p. assigned to *offerre*, to offer). The name of a class of religious communities in the Roman Catholic church, differing from the religious orders strictly so called in not being bound by regular vows, instead of which they make an offering (oblation) of themselves to the superior or bishop, with a promise of constancy. The principal associations of this class are: 1. The Oblates of St. Ambrose, or of St. Charles, whose foundation in 1578 was one of the many works undertaken in his diocese by St. Carlo Borromeo (q.v.), Archbishop of Milan. The members were secular priests who lived in community, and were merely bound by a promise to the Archbishop to devote themselves to any service which he should consider desirable for the interest of religion. St. Carlo made use of them chiefly in the wild and inaccessible Alpine districts of his diocese. In the suppression of small communities under Urban VIII and Innocent X the institution became extinct, but was revived by Archbishop Romilli of Milan in 1848. In 1856 a community on the same model was established in England by the future Cardinal Manning and his successor as Archbishop, Cardinal Vaughan, for aggressive work in London. The English oblates, whose statutes were confirmed by the Pope in 1857 and 1877, have now several houses. 2. The Oblates of Mary Immaculate was founded in 1816 by Charles Eugène de Mazenod, Bishop of Marseilles (1837-61), to repair the losses to religion caused by the French Revolution. Their rule was confirmed by Leo XII in 1826. They were introduced into Canada in 1841 and the United States in 1848. The congregation, which has about 70 houses in all parts of the world, now numbers over 1000 members, the majority of them priests. The mother house was in Marseilles till 1861, in Paris till 1902, in Liége till 1905, whence it was transferred to Rome. The general is elected for life; a general chapter is held every six years. They conduct a large number of educational and charitable institutions, among them the Catholic University of Ottawa. For the life of the founder, consult Ricard, *Monseigneur de Mazenod* (Paris, 1892). 3. The Oblates of St. Frances of Rome, popularly known as Donne di Tor di Specchi. This association grew out of the charitable work of the pious woman whose name it bears, and took up its community life in 1433 in the house in Rome which it still occupies. To this house, still the only one possessed by the institute, St. Frances went on her husband's death, and was superior till her death in 1440. The oblates are mostly ladies of noble birth, and have done much good in educational and charitable works. They, with the Jesuits, were expressly excepted from the reforming decrees of the Council of Trent affecting the regular orders; and their statutes gave St. Francis de Sales the idea of his Order of the Visitation. For the original foundation, consult Lady Georgiana Fullerton, *Life of St. Frances of Rome* (London, 1855). 4. The Oblates of St. Francis de Sales, an order originated by St. Francis, but dying out at the beginning of the eighteenth century. The order was revived in 1871 and was approved by the Pope in 1875 and 1897. It is divided into three provinces, Latin, German, and English, with the mother house at Rome. It works in schools and parishes. The English province founded its novitiate in Wilmington, Del., in 1903, but transferred it to Childs, Md., in 1907. It conducts schools and has charge of some parish work in Delaware and Maryland.

OB′LIGATE PLANTS (from Lat. *obligare*, to bind, from *ob*, before, towards + *ligare*, to bind). Plants which can grow in but one life condition. This term, which is contrasted with facultative plants, is applied particularly to parasites and saprophytes. For example, dodder is an obligate parasite, because it has not the power to grow independently. Obligate is also used in a still more restricted sense; certain forms of dodder can grow upon only one host plant and are, therefore, regarded as obligate in that sense. In the case of fungi the distinction between the obligate and facultative habits is very marked. Some fungi are obligate parasites, others are obligate saprophytes, while still others are facultative, being able to live either as parasites or as saprophytes.

OB′LIGA′TION (Lat. *obligatio*, bond, from *obligare*, to bind), AT CIVIL LAW. In the widest sense legal obligation is equivalent to legal duty, but the technical meaning of the expression is much narrower. Continental jurists confine the term, in the first place, to duties towards a particular person or group of persons, excluding duties towards the state or community; in the second place, to duties assumed by or imposed upon a particular person or group of persons, excluding duties which rest upon all members of the community. Further, not all duties of particular persons to particular persons are designated as obligations; they are not so described when the duties result from some preëxisting legal relation between the parties, like marriage. Finally, the term "obligation" is ordinarily restricted to cases where the right which corresponds to the duty imposed upon or assumed by the person obligated has economic value. Technically, then, obligations are special legal relations in which one or more persons, usually described as creditors, are entitled to claim from one or more persons, usually described as debtors, acts or forbearances which are in the economic interest of the creditors. In Roman law and in the law of Latin countries at the present time the word "obligation" is used to describe as well the legal relation, the duty of the debtor, and the right of the creditor.

The creditor's right is a right to performance. In early law this right ran directly and exclusively against the debtor's person. Later the claim could be satisfied by seizure of goods, and ran against the person only in the second instance; and execution upon the person was transformed into imprisonment for debt. Since the general abolition of imprisonment for debt the creditor's claim has become simply a claim against the estate of the debtor. The duty of a person in possession of property to restore such property to its owner resembles the duty of a vendor to deliver the thing sold to the purchaser; but in the former case the duty results from the owner's right in rem and is not properly described as an obligation. See IN REM; IN PERSONAM.

In the Roman Imperial law the courts enforced specific performance whenever this was possible, awarding pecuniary damages also on account of the debtor's delay. If specific performance could not be enforced, they awarded pecuniary damages, which were so measured as to put the creditor in as good a position economically as he would have occupied if the debtor had performed at the proper time and place. The same rules are applied in modern civil law, although some of the modern codes provide that in case of money debts damages shall not exceed the legal interest. The fact that the creditor's claim is in most cases enforceable only through the award of damages is the reason why it is usually asserted that no obligation exists unless the creditor's interest is measurable in money. Indirectly, however, an act or forbearance in which the promisee has no pecuniary interest can be secured by an agreement that the promisor shall pay a certain sum of money if he fails to do what he has promised or does what he has promised not to do. Such conventional penalties were enforced in the Roman law and are enforced under modern civil law; and although some of these codes do not require that the creditor's interest be measurable in money, claims not thus measurable can be enforced only where a decree of specific performance can be obtained from the court or where a penalty has been stipulated for.

While the obligation is thus sharply distinguished from the right to a thing, it is nevertheless true that the right of a creditor, like the right of an owner, is a property right. Like any other property right it may be transferred to a purchaser; it may be pledged or hypothecated by the creditor to his creditor; it may be attached by the creditor's creditor; in case of the bankruptcy of the creditor it passes with his other assets to his creditors; and in case of the creditor's death it passes with the rest of his estate to his legal or testamentary heirs (as in English law it passes to the executors or administrators). Hence the Roman jurists, viewing property as consisting of things, termed the obligation an incorporeal thing, and English law operates with the same conception.

Where there are two or more creditors or two or more debtors, each creditor may be entitled to sue only for his share of the claim, and each debtor may be liable only for his share of the debt. In certain cases, however, any one of the creditors may be entitled to demand full performance and any one of the debtors may be held liable for the full debt. The effect of performance to one creditor is to extinguish the right of the others, and the effect of performance by one debtor is to liberate the others. All such rules, however, apply only to the relation between the creditor or creditors and the debtor or debtors, and do not touch the relation of the joint creditors to each other or that of the joint debtors to each other. If the joint creditors have really (i.e., equitably) a joint interest, the creditor who has received payment must satisfy the other creditors; and if the debt was really a joint debt, the debtor who has paid is entitled to hold the other debtors to contribution.

Obligations as regards their origin were divided by the Roman jurists into four classes: (1) those established by contract (*ex contractu*); (2) those established by tort of the debtor (*ex delicto*); (3) those which resemble contractual obligation, although no contract has been concluded (*quasi ex contractu*); and (4) those which resemble obligations on tort, although the debtor himself has committed no tort (*quasi ex delicto*). The most important quasi-contractual obligations are those based on unjust enrichment and those which spring from unauthorized agency. The quasi-tortious obligations include all the cases in which a person (father, employer, etc.) is held liable for a tort which he did not commit or authorize. The classification is open to criticism, and, while modern civil codes recognize obligations of the third and fourth class, they are sometimes described as obligations imposed by law. This description is also open to criticism as implying that contractual obligations are not imposed by law.

Obligations are normally extinguished by performance, and the creditor, if he sees fit, may accept as performance something other or something less than he is entitled to demand. Tender of performance does not have the same effect; but if the obligation is to pay a sum of money or to deliver goods, the debtor is liberated by depositing the money or goods in a safe place subject to the creditor's order. Obligations are also extinguished by the substitution of new obligations (novation), if such was the intention of the parties; by merger, when the claim and the debt are united in the same person (e.g., by inheritance); by set-off, when a debtor, being sued, is able to put in a counterclaim; by release; and by discharge in bankruptcy proceedings.

The Roman jurists sometimes used the term "natural obligation" to mean an obligation recognized by natural law (q.v.), thus including the majority of legal obligations. More technically, however, they employed the term to describe an obligation which was legally imperfect and which could not be enforced by action at law, but which a scrupulous man would recognize and perform. To all such natural obligations they attributed at least this effect, that voluntary performance was to be regarded as performance of a duty and not as a gift. Further, money paid or property transferred under the mistaken impression that a legal obligation existed could not be recovered if a natural obligation existed. In many cases, moreover, a natural obligation was a sufficient basis for suretyship or for a new promise, and in a few cases such an obligation could be used as a set-off against a legal obligation. Modern legislators do not regard the conception with favor, but the courts have not been able to dispense with it. Consult the authorities referred to under Civil Law.

OBLIQUE MOTION. See Harmony.

OBLOMOV, ô-blŏ′mŏf. The title of a famous novel of Goncharov (q.v.).

OBOE, ō′boi (It. *oboe*, from Fr. *hautbois*, Eng. *hautboy*, high wood, so called from the high notes of the instrument, from *haut*, high + *bois*, wood). A double-reed wood-wind instrument which in its simplest form is of great antiquity and is traced in the sculpture of Egypt and Greece. Its present form is a development of the older shawm (q.v.). It is made of wood, generally of box, ebony, coco, or rosewood, and is constructed in three pieces, or joints, forming a continuous tapering tube about 21 inches long, the bore of which is narrow at the small end and widens into a bell-shaped opening 1½ inches in diameter at the mouth. In the upper and middle piece there are holes, by stopping or opening which with the fingers the player forms the notes of the natural scale, the intermediate semitones being formed by the keys, the number of which varies from 9 to 14. The reed is fixed upon the end of a small brass tube which fits, socket-like, into the small end of the upper piece. The range of the instrument is from b to f^3. The sound of the oboe is reedy and penetrating, though mild, and from its great power in swelling or diminishing the sound it is capable of every variety of expression. In the modern orchestra three oboes are employed—the treble oboe, a nontransposing instrument, the music for which is written in the G clef; the alto oboe or cor anglais (q.v.), a transposing instrument in the key of F; and a tenor oboe, the heckelphone (q.v.), named after its inventor. The oboe d'amore, in use in the eighteenth century, became obsolete, but was reconstructed by M. Mahillon, of Brussels, at the order of M. Gevaert, in order to perform correctly the works of Bach. See Musical Instruments.

OBOK, ô-bŏk′. A decaying seaport of French Somaliland (q.v.), situated at the west end of the Gulf of Aden (Map: Egypt, E 5). The harbor is shallow and unprotected, and its trade and government offices have been transferred to Jibuti. It was acquired by France in 1855, and with the surrounding district formed the colony of Obok, which became the nucleus of the French possessions in Somaliland. Pop., about 450.

OB′OLEL′LA (Neo-Lat., dim. of Lat. *obolus*, from Gk. ὀβολός, *obolos*, small coin). A small fossil brachiopod of oval or rounded outline common in and very characteristic of Cambrian rocks of North America and Europe.

OB′OLUS (Lat., from Gk. ὀβολός, *obolos*). The name of a Greek measure of weight and a Greek coin. Six of these oboli made a drachma. See Drachma.

OBRADOVIĆ, ô-brä′dô-vĭch, Dosithei (c.1742–1811). A Servian author, the father of modern Servian literature. He was born at Csákovár, Hungary, and at the age of 15 entered the monastery of Opovo in the Fruska Gora, Syrmia. But his insatiable curiosity made the life of a monk distasteful and three years later he started on a series of long journeys. He learned the languages of the countries he was in and, although 40 years old, studied philosophy and natural theology at the universities of Leipzig and Halle. At Leipzig he published in 1783 *Život i priklučenija* (Life and Adventures), partly autobiographic and partly fantastic. This was the first book written in the popular speech of the Servians, and made it a literary language. After a visit to France and England he returned to Leipzig, where he published a translation of *Æsop's Fables* (1788), and then spent several years in Vienna and Triest. In Belgrade, where he settled in 1807, he was made Senator and Minister of Public Education. He founded the High School, which later became the University of Belgrade, and a theological seminary. Obradović also wrote *Sověti zdravago razuma* (Wise Counsel) (1784) and a work on morals, *Sobranie nravoučitelnych veščej* (1793, 1818). Consult Šević, *Dositheus Obradović* (Neusatz, 1889), and Léger, *Serbes, Croates et Bulgares* (Paris, 1913). The complete works of Obradović were published at Belgrade by Vozarović (10 vols., 1833–45).

OBRECHT, ō′brĕkt **(OBREHT, OBERTUS, HOBRECHT, HOBERTUS),** Jakob (c.1430–c.1506). A Dutch conductor and composer, born at Utrecht. He became kapellmeister of the cathedral in his native city in 1465 and of Notre Dame, Antwerp, in 1492. In 1494 he received a chaplaincy. His masses, *Je ne demande*, *Grecorum*, *Fortuna desperata*, *Malheur me bat*, and *Salve diva parens*, were printed by Petrucci in *Missæ Obreht* (1503). His other masses, hymns, and motets are to be found in various collections.

OBREGON, ō′brā-gōn′, Alvaro (1880–). A Mexican soldier. He was born in the District of Alamos, Sonora, and after receiving a good education devoted himself to scientific agriculture and stock raising on his estates in Sonora. His fondness for mechanics resulted in the invention of several pieces of agricultural machinery. Obregon evinced sympathy for the peons and Indians and was interested in the problem of their education. As a military leader his career began in 1912, when he recruited and equipped a force of 400 Yaqui Indians, of which he became lieutenant colonel and which he placed in the service of Madero (q.v.) against the revolt of Orozco (q.v.). As commander of cavalry Obregon carried out a brilliant campaign in Chihuahua and Sonora and forced Orozco to flee to the United States.

After the suppression of the revolt Obregon returned to his agricultural life. In 1913 he joined Carranza in the opposition to Huerta. He skillfully waged warfare on the Federalists, winning the battle of Santa Rosa in June, for which service he was raised to the rank of general. In 1914 he was commander of the Constitutionalist Army of the West. His successful storming of Sinaloa and Culiacán and the capture of Guadalajara (July 9) served to open the way for the advance on Mexico City. On Aug. 15, 1914, he led the Constitutionalist forces into the capital. In the break between Carranza and Villa General Obregon sided with the former, and was considered the most able commander of the Carranzistas. He captured Puebla (January, 1915) and reoccupied Mexico City after the departure of the forces of the Convention (Jan. 27, 1915), but evacuated the city again on March 10. During April, May, and June Obregon undertook a campaign against Villa for the control of central Mexico. He repulsed the attacks of Celaya (April 15-19) and defeated Villa in the battle of Léon (May 31-June 4), where he was severely wounded. See MEXICO, *History*.

OBRENOVITCH, ō-brĕn′ō-vĭch. A ruling family of Servia which attained power in 1817. See the articles on its most important members: MILOSH, MICHAEL III, MILAN IV, ALEXANDER I; also SERVIA, *History*.

O'BRI'EN, FITZ-JAMES (1828-62). An Irish-American poet, story-teller, and journalist, born in Limerick. He was educated at the University of Dublin, served for a time, as is supposed, in the British army, and squandered a considerable inheritance in London, editing a periodical in aid of the first World's Fair (1851). The next year he came to the United States. His most striking work appeared in the *Atlantic Monthly*, notably two fine short stories, *The Diamond Lens* and *The Wondersmith*, and most of the American magazines of his day welcomed his contributions. He supplied the stage also with many ephemeral dramas and with one, *A Gentleman from Ireland*, that held the boards for a generation. In the Civil War he served in the Seventh New York Regiment and was also on the staff of Gen. F. W. Lander. He was severely wounded, and after a lingering illness died in Cumberland, Md., April 6, 1862. He was a distinguished figure in the Bohemian New York of his day, and witness to the impression that he made in that sprightly circle is preserved in a sheaf of personal recollections prefixed to *The Poems and Stories of Fitz-James O'Brien*, edited by his friend William Winter (1881). Mr. Winter also gives an interesting chapter on O'Brien in his *Brown Heath and Blue Bells* (New York, 1895).

O'BRIEN, JEREMIAH (1744-1818). An American patriot, born probably at Kittery, Me. In 1775 the captain of the British armed vessel *Margaretta* threatened to bombard the town of Machias, where O'Brien then lived, unless the liberty pole were removed. On June 12 O'Brien and his five brothers, accompanied by about 35 of their townsmen, many of them armed only with pitchforks, manned a little sloop in the harbor, attacked the *Margaretta* and after a brief engagement captured her. After the battle Captain O'Brien transferred the *Margaretta's* cannon to his own vessel, which he rechristened the *Machias Liberty* and used as a coast patrol. Later he became a privateer captain sailing under letters of marque from the Colony, and while commanding the *Hannibal*, 20 guns, was captured by two British frigates and sent to England, where he was confined in the Mill Prison. After the close of the war he was appointed the first collector of the port of Machias.

O'BRIEN, LUCIUS RICHARD (1832-99). A Canadian painter, born at Shanty Bay, Ontario, and educated at Upper Canada College, Toronto, where he studied architecture and civil engineering. He came to be considered the best painter in water colors that Canada has produced. As first president of the Royal Canadian Society of Artists he furthered the interests of other artists and Canadian art in general. His best paintings are descriptive of scenery upon the lower St. Lawrence. Some of his works were placed in Windsor Castle, England, and in the royal palace at Osborne, Isle of Wight.

O'BRIEN, WILLIAM (1852-). An Irish journalist and parliamentary leader. He was educated at Cloyne Diocesan College and at Queen's College in Cork. In 1875 he joined the staff of the *Freeman's Journal* and in 1880 founded the *United Ireland*. Because of his political activity he was nine times prosecuted by the law officers of the crown and was imprisoned for more than two years. He represented the Nationalists in Parliament almost continuously from 1883 until 1895, when he retired because of dissensions in the party. In 1890 he visited the United States and collected considerable funds for the benefit of the Irish cause, and after Parnell's conviction he became one of the leaders of the anti-Parnell faction. In 1898 he originated a new agrarian movement under the name of the United Irish League and founded the *Irish People* as its organ. He was again a member of Parliament for Cork City after 1900. He published several books, among them *When we Were Boys* (1890), written in prison; *Irish Ideas* (1894); *A Queen of Men* (1897); *Recollections* (1905); *An Olive Branch in Ireland and its History* (1910).

O'BRIEN, WILLIAM SMITH (1803-64). An Irish politician. He was educated at Harrow School, whence he passed to Trinity College, Cambridge. He entered Parliament for the Borough of Ennis in 1828. In 1835 he was returned for the County of Limerick, and for several years strongly advocated the claims of Ireland to a strictly equal justice with England in legislative as well as executive measures. Professing his inability to effect this in the United Legislature, and having been committed to prison in the House of Commons by the Speaker's orders for refusing to serve on committees, he withdrew from attendance in Parliament in 1841 and joined actively with Daniel O'Connell (q.v.) in the agitation for a repeal of the legislative union between England and Ireland. In the progress of that agitation O'Brien joined the party known as Young Ireland in establishing the Irish Confederation, and when the political crisis of 1848 resulted in a recourse to arms, he took part in an attempt at rebellion in the south of Ireland. He was arrested, convicted, and sentenced to death. The sentence, however, was commuted to transportation for life. He was transported to Tasmania, but in 1856, in common with the other political exiles, he was permitted to return to his native country. He published *The Principles of Government; or, Meditations in Exile* (1855). Consult A. M. Sullivan, *New Ireland* (London, 1877), and C. G. Duffy, *Young Ireland* (2d ed., ib., 1883).

OBSCENE, OBSCENITY. In law, conduct or published writings which have a corrupting or depraving effect on the public morals.

The offense is now generally defined and the punishment prescribed by statute. These statutes cover any gross violation of public decency, such as the indecent exposure of the person in a public place, the public utterance of foul and lewd language, etc., as well as the publication of obscene literature. Under most statutes dealing with the subject any circulation of an indecent writing or picture, even the selling, giving or showing of a copy thereof to a single individual, or its exposure in a public place, as a shop window, subjects the offender to the penalties of the law.

In England as well as in the United States it has been made a statutory offense to use the mails for the transmission of such matter, and, in the latter country at least, most of the important prosecutions over indecent literature are for such improper use of the mails.

Both in England and in this country laws of this character have been much criticized as involving a serious and, in the United States, an unconstitutional limitation on freedom of speech and the liberty of the press. There is just ground for criticism in the unintelligent and illiberal spirit in which these laws are often applied by courts and juries, with the result that the progress of science and of social reform is often hampered and seriously delayed through the suppression of medical and sociological works of a strictly scientific character.

See INDECENCY; CENSORSHIP; LIBERTY OF THE PRESS and the authorities referred to. Consult Schroeder, *Obscene Literature and Constitutional Law* (New York, 1911).

OBSCURE MEN, LETTERS OF. See EPISTOLÆ OBSCURORUM VIRORUM.

OBSERV'ATORY (from Lat. *observare*, to observe, from *ob*, before + *servare*, to keep; connected with Skt. *sar*, Av. *har*, to protect). An institution supplied with instruments for the regular observation of astronomical, meteorological, or magnetic phenomena. In some observatories, all three classes of observation are carried on, but in most cases special attention is paid to astronomy alone, and only such meteorological observations are taken as are required for the calculation of the effect of atmospheric refraction on the position of a heavenly body; there are, however, a few observatories which are devoted solely to meteorological or magnetical observations.

While observation of the heavenly bodies dates from prehistoric times and individuals at intervals made their crude observations of the heavens, the first observatory, in our modern sense of the word, was that of Alexandria, founded about 300 B.C. It continued in activity till 200 A.D., and it was here that Hipparchus discovered the precession of the equinoxes and fixed the positions of the sun, moon, and planets by means of armillary spheres (see ARMILLARY SPHERE) and astrolabes (see ASTROLABE), having graduated circles on which celestial latitudes and longitudes could be read off when a pair of sights was pointed to the heavenly body. Ptolemy used a quadrant, with which he measured zenith distances on the meridian. In the ninth and tenth centuries the Arabs founded observatories at Bagdad, Damascus, and Mokattam, near Cairo. In the latter place the Hakimite tables were constructed. In the thirteenth century the splendid observatory at Meragha, Persia, and in the fifteenth century that of Samarkand were founded by Mongol Khans. Here planetary tables and star catalogues were constructed. The first observatory in Europe was that of Nuremberg, erected in 1472, and the revival of astronomical observations in Europe dates from its foundation. In 1576 Tycho Brahe began the erection of his famous observatory on Hven, an island in the Sound. He converted the quadrant used by Ptolemy into an altazimuth by mounting it on a vertical axis in connection with a horizontal or azimuth circle. It was not till the middle of the eighteenth century that the improvement of time measurement with pendulum clocks enabled astronomers to rely for the determination of right ascensions on the times of passage across the meridian instead of on measurements with a graduated circle. The quadrant was then fixed in the meridian, and, being attached to a massive wall, its dimensions were increased and greater accuracy thereby secured in the determination of meridian zenith distances. Neither the quadrant nor the mural circle (q.v.) which succeeded it, however, could be relied upon for accurate motion in the plane of the meridian, but Römer remedied this defect by inventing the transit instrument (q.v.), which enabled astronomers to observe the times of meridian passage or transit with great accuracy and thus to determine the right ascension of the heavenly bodies by means of the apparent diurnal movement. With the transit and quadrant Bradley commenced that series of observations of the positions of the sun, moon, planets, and stars which have been continued ever since at Greenwich, and on which, in combination with less extensive series at Paris, Königsberg, and elsewhere, all our tables of the motions of the heavenly bodies are founded. In modern observatories the transit and mural circle have been combined into one instrument, the meridian circle (q.v.), which determines both right ascensions and declensions at a single observation.

The great observatories of the world may be divided into several classes. In the first place, we have the great government institutions occupied with continuous observations such as are needed to strengthen our knowledge of the fundamental parts of astronomy. The Royal Observatory at Greenwich, England, is perhaps the most important of this class. (See GREENWICH OBSERVATORY.) It was founded by Charles II. Similar institutions are established at Paris, Berlin, Pulkovo (q.v.), near St. Petersburg, and Washington. At the last-named place the observatory is called the United States Naval Observatory (see NAVAL OBSERVATORY), and the astronomers are professors of mathematics in the United States navy. Another class of observatories is composed of that maintained by universities and other educational institutions. These are intended to combine instruction with research, and in them an effort is usually made to extend the science by special investigations rather than by long-continued routine observation. In the United States the principal observatories of this class are the Harvard College Observatory (q.v.), the Lick Observatory (q.v.) of the University of California, and the Yerkes Observatory (q.v.), belonging to Chicago University. Finally, we have the very important class of astrophysical observatories which are occupied with a study of the physics of the heavenly bodies. The most important of these are the Mount Wilson Solar Observatory, supported by the Carnegie Institution of Washington, and the observatory at Potsdam, Germany. Much astrophysical work is also done at the university observatories of Harvard and Chicago. See GREENWICH OBSERVATORY; HARVARD COLLEGE OBSERVATORY; MERIDIAN CIRCLE; TELESCOPE. For observatories for the observation of the variations of latitude, see LATITUDE, VARIATION OF.

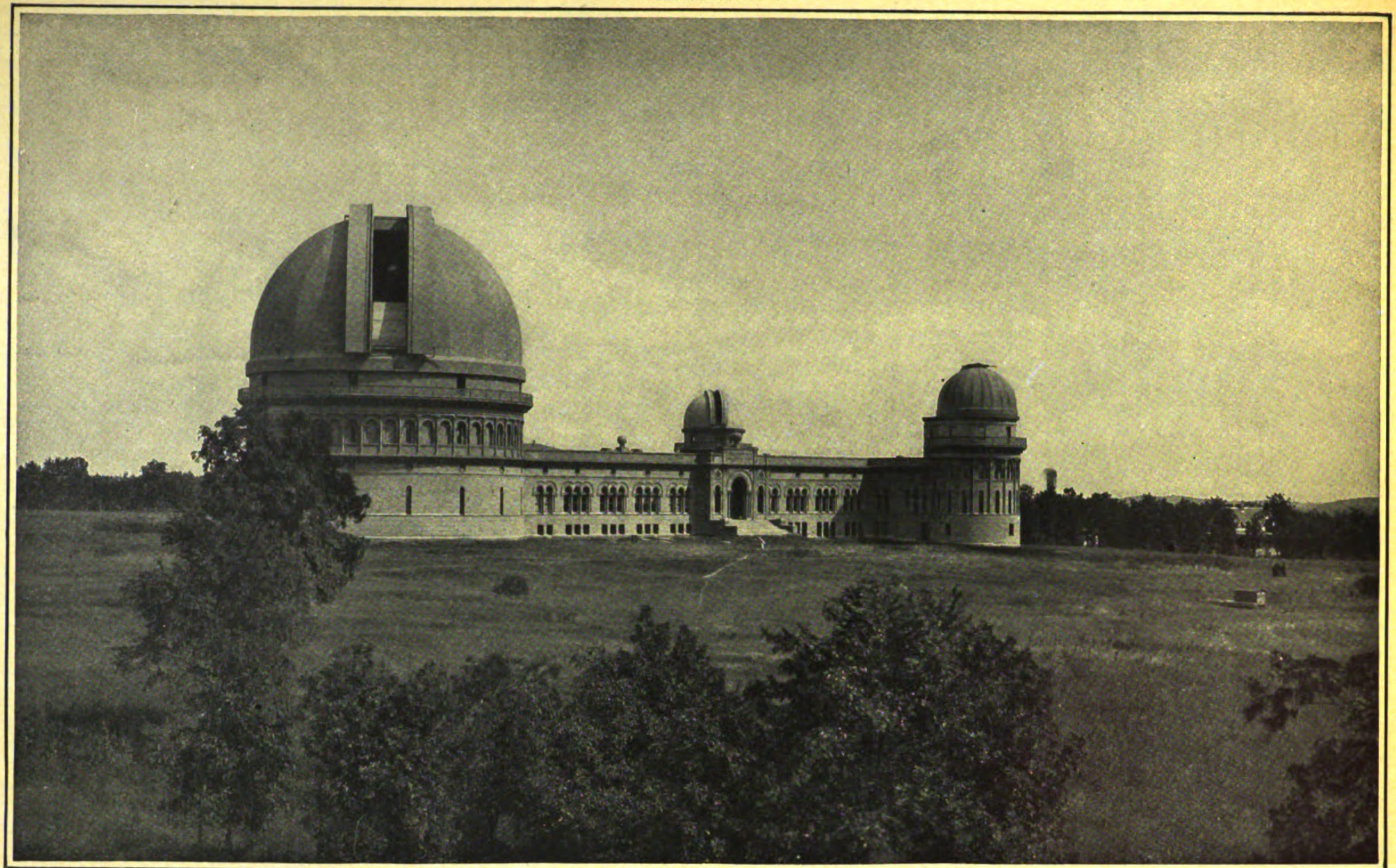
OBSERVATORY, ASTROPHYSICAL. See SMITHSONIAN INSTITUTION.

OBSID'IAN (from Lat. *obsidiana*, false reading for *obsiana*, a sort of mineral, probably obsidian, from *Obsidius*, false reading for *Obsius*, name of a man who is said to have discovered it in Ethiopia). A volcanic glass consisting of silica in combination with aluminium, calcium, iron, potassium, and sodium. It is hard and brittle, with a remarkable vitreous lustre and a perfect conchoidal fracture, the edges of the fracture, which are semitransparent or translucent, being very sharp and cutting like glass. Obsidian is generally black or very dark gray, but sometimes has a green, red, or brown color, is striped or spotted, and even chatoyant or aventurine. It occurs in volcanic regions, in round compact pieces, granular or fibrous. It is often found in association with pumice, which is identical with it in chemical composition but different in structure. Obsidian is found principally in the volcanic regions of the world. It takes a high polish, but is very brittle. It was extensively used among primitive peoples for arrowheads and spearheads, for knives, mirrors, polished figures, and ornaments, the best specimens of which have been found in Mexico. The early Romans obtained obsidian mirrors from Ethiopia. See GEMS.

OBSTET'RICAL TOAD. See MIDWIFE FROG.

OBSTET'RICS (from Lat. *obstetricius*, relating to a midwife, from *obstetrix*, midwife, from *obstare*, to stand before, from *ob*, before, towards + *stare*, to stand), MIDWIFERY. That branch of medicine which is concerned with the care of women during pregnancy and during and after labor, whether natural or irregular, with the diseases peculiar to the puerperal state, and with the care of the newborn child. It also embraces a knowledge of the anatomy of the female generative organs and the physiology of reproduction in the human species. While among the savages little or no assistance is given to the parturient woman and the process is left to unaided nature, among civilized peoples from the earliest times there has been a class of persons—usually women—who have attended women during this trying period. The Jews had women (called *mejelledeth*) who acted as midwives, as did the Egyptians; and among the Greeks there was a corresponding class of women known as *maieutriæ*. Phanarete, the mother of Socrates, was a midwife; and Plato explains the duties undertaken by these women. Hippocrates gave considerable attention to midwifery, and describes the operation of turning the child (version) in abnormal labors. Among the Romans both physicians and midwives (*obstetrices*) attended confinements. Cæsarean section was performed after the death of the mother, and Pliny mentions that Scipio Africanus and Manlius were born in this way. There was a royal law (*lex regia*) providing for the performance of this operation when necessary. Celsus and Rufus of Ephesus wrote of obstetrics during the first century, and a gradual increase in the knowledge of the physiology and mechanism of labor can be traced in the writings of Galen (second century), Ætius (fifth century), and Paulus Ægineta (seventh century). The latter advocated the operation of craniotomy in suitable cases. During the Middle Ages there was little progress in obstetric science in Europe, but the Arabian and Persian schools made many improvements in this branch of medicine as well as in others. Midwives did most of the work, but physicians were called in abnormal cases. Rhazes of Bagdad (860–932) first advised artificial rupture of the membranes when spontaneous rupture was unduly delayed; and Avicenna of Ispahan (980–1036) described an instrument somewhat like the modern forceps. The teachings of these two physicians became celebrated throughout Europe and the East and were followed for many years. In the dark times of the Middle Ages as a rule only women practiced it, and laws were passed in Germany in 1580 to prevent shepherds from attending women in labor. In 1533 the celebrated *Constitutio Criminalis Carolina* was published in Germany, dealing also with criminal abortion. With the revival of learning the science of midwifery began to receive the attention of the most famous physicians. Vesalius (q.v.) in 1543 first correctly described the bony pelvis, and Levret in France (1754) and Smellie in England (1751) completed his work 200 years later by taking exact measurements of the several diameters of the pelvic cavity.

At the commencement of the sixteenth century Eucharius Röslin wrote a little book on obstetrics entitled *Der schwangeren Frawen und Hebeammen Rosengarten* (Worms, 1513), translated into English by William Raynalde, *The Byrthe of Mankynde* (London, 1545), while cities found it necessary to publish instructions to midwives, *Regensburger Hebammenbuch* (Ratisbon, 1555). In 1550 Ambrose Paré (q.v.) published a small work in which he showed that foot presentations were not dangerous and that in malpresentations it was better to deliver by the feet than to attempt to bring down the head. His teachings were developed and improved by De la Motte and Mauriceau, his successors, and François Rousset, who in 1581 reported 15 successful Cæsarean operations. About 1670 William Chamberlen, Sr., a French Huguenot emigrant to England, invented the forceps with separate blades. The Chamberlens through three generations—William, Peter, Sr., Hugh, and Peter, Jr.—did not publish their invention, but kept it a family secret for nearly 150 years, and it was not until 1815 that the exact nature of the instrument became known. Midwives also appeared as authors. Louise Bourgeois, who attended Maria de' Medici in her six labors, wrote *Observations sur la sterilité et maladies des femmes* (Paris, 1626), Jane Sharp published *Compleat Midwife's Companion* (London, 1671), and Justine Siegmund, the court midwife of Brandenburg, contributed in 1690 a treatise on this subject. In the middle of the seventeenth century male obstetricians again appeared. Jules Clément attended Madame de la Vallière, mistress of Louis XIV of France, in her confinement, in 1663, OBSERVATORY



THE YERKES OBSERVATORY OF THE UNIVERSITY OF CHICAGO, AT LAKE GENEVA, WISCONSIN

which was to be kept secret, and, receiving the title of royal accoucheur, attended the Dauphiness and other court ladies. In 1668 François Mauriceau (1637–1709), to whom Hugh Chamberlen had offered to sell the forceps for 10,000 crowns, published his *Traité des maladies de femmes grosses* (Paris), and this was for a long time the standard work on the subject. Next in importance was Hendrick van Deventer (1651–1724), *Novum Lumen* (The Hague, 1696), the author being an accoucheur, while his wife acted as midwife. This work appeared in an English translation in 1716 under the title *The Art of Midwifery Improved* (London). A point requiring notice in the history of midwifery in the seventeenth century is the discovery of the use of ergot of rye in accelerating parturition. In 1688 Camerarius stated that midwives in some parts of Germany were in the habit of employing it for this purpose, but it is not till 1774 that we find any further reference to the use of this drug. Important contributions to obstetric knowledge during the eighteenth century were made by William Smellie, of London (1697–1763), better known, perhaps, as the friend and teacher of Smollett; William Hunter, of Glasgow (1718–83); Charles White, of London; and Sir Fielding Ould, of Dublin (1710–89); André Levret (1703–80); Jean Louis Baude-Cougne (1746–1810), and the two midwives Madame La Chapelle (1769–1821) and Madame Boivin (1773–1841), all of France; Carl Caspar Siebold (1736–1807), Lucas Johann Boer (1751–1835), and Johann Georg Boderer (1726–1763), of Germany; and Mathiews Saxtorph (1740–1800), of Copenhagen. The first, however, to give a clear and correct explanation of the entire mechanism of labor was Franz Carl Naegele (1778–1851), who may be considered the founder of modern obstetric science. In the nineteenth century many notable improvements in the art of midwifery were made; among them may be mentioned the induction of premature labor by Carl Wenzel in 1804; the auscultation of the fœtal heartbeat; the use of ergot by John Stearns, of Massachusetts (1808); the contagiousness of puerperal fever by Holmes, of Boston (1843), and Semmelweis, of Budapest (1847); the perfection of the obstetric forceps by Etienne Tarnier, of Paris (1877), and others; the employment of general anæsthesia by Sir James Young Simpson, of Edinburgh (1811–70); the introduction of antiseptics by Etienne Tarnier, of Paris (1881), and others; the instillation of silver nitrate solution into the eyes of the newborn by Carl Siegmund Franz Crede, of Leipzig (1884); the invention of the speculum by Beramier (1842) and the improvement by James Marion Sims, of New York (1813–83); the excision of the uterine appendages by Robert Battey, of Augusta, Ga. (1872); the operations by Howard James Kelly (1858–1913) and many others. Spinal anæsthesia was introduced by James Leonard Corning, of New York, in 1885, and into obstetrics by H. J. Kelly, in 1887, but was soon discontinued on account of its dangers. Twilight sleep (q.v.) is the latest attempt to obviate the pains of labor. Bollag (1915) injected the pudic nerves with a solution of novocain, and reported 225 cases of painless childbirth by this method. Obstetrics is now an important part of the curriculum of medical schools, and lying-in hospitals in connection with these schools have been established. Vienna has long been recognized as the centre of obstetrical teaching, the hospital in that city confining about 10,000 women annually. Good schools are also to be found in Paris, Berlin, Dublin, and New York. The latter city, on account of its large foreign population, affords unusual clinical advantages. In most countries on the Continent, especially in Austria, Denmark, France, Germany, Holland, Hungary, Italy, Norway, Sweden, and Switzerland, there exist schools for midwives, under state control, attached to large hospitals and, where possible, to the medical department of a university, from which the midwives, after theoretical and practical instructions, graduate. The charges are regulated by the state, and the work of the practicing midwife is kept under surveillance by state physicians. In Great Britain and the United States, among the better classes, confinements are intrusted exclusively to physicians.

The science of midwifery may be considered under three main divisions—the anatomy of the female generative organs, the physiology of these organs during the process of reproduction, and the pathological conditions which may arise during this period.

Anatomy. The generative organs of the female consist of the uterus, the two ovaries, connected with the uterus on either side by the Fallopian tubes, which open into its cavity, and the vagina, or canal leading from the uterus to the external parts. The breasts are also included, although only active after the birth of the child.

Physiology. Reproductive activity, including the functions of menstruation, conception, gestation, parturition, and lactation, begins at about the twelfth year and ends about the forty-fifth. These limits vary by a few years according to climate, an earlier maturity being characteristic of hot countries. When conception has taken place the impregnated ovum lodges in the cavity of the uterus, where it develops through the agency of a convoluted mass of blood vessels called the placenta, from which the umbilical cord runs to the abdomen of the fœtus, through which nerves and blood vessels are carried from the mother to the fœtus. The duration of normal pregnancy varies from 275 to 280 days (9 calendar or 10 lunar months), but gestation may be prolonged beyond this time in very rare cases to 300 or 306 days. Pregnancy is terminated with the expulsion of the child by the contractions (labor pains) of the powerful muscular fibres of the uterus. The more important signs and symptoms of pregnancy are the perception of the fœtal heartbeats by the ear (auscultation), quickening or active movements of the child in utero, passive movements (ballottement) elicited by manipulation, suppression of the menses, morning nausea, gradual enlargement of the abdomen and breasts, and pigmentation of the area immediately surrounding the nipple. Of these only the first three can be considered certain indications of pregnancy, the existence of which can rarely be diagnosed with precision before the third month. Pregnancy can also be diagnosed by the X rays (q.v.) as soon as the fœtal bones begin to appear, and Abderhalden's seroreaction offers the possibility of a still earlier diagnosis. During gestation the fœtus floats freely in a sac of water called the amniotic fluid, and changes its position frequently. When parturition begins, however, the long axis of the fœtus usually coincides with that of the mother, with the head downward, or presenting at the pelvic outlet. This is by far the most common presentation, occurring in about 96 per cent of all cases. In about 3 per cent the buttocks or feet present. About once in 200 labors what is known as a transverse presentation is met with (i.e., the long axis of the child is at right angles to that of the mother). Delivery being impossible in this position, artificial correction of the presentation, usually by turning and bringing down the feet, must be resorted to. Labor is arbitrarily divided into three stages. The first stage begins with the earliest premonitory pains and ends with the complete dilatation of the uterine outlet; this stage may last several hours or even days. During the second stage the bag of water ruptures, the uterine contractions become stronger, and the child passes through the parturient canal and is born. This event completes the second stage. The third stage ends with the expulsion of the placenta and fœtal membrane and lasts usually about half an hour. The duration of labor in first confinements is on an average about 12 hours, in succeeding labors from six to eight hours, although much longer periods are not dangerous or uncommon. The puerperal or lying-in state begins at the completion of labor and lasts about six weeks. During this time lactation is inaugurated and the uterus gradually resumes its wonted size and shape (involution). The length of the lying-in period varies in different countries and races; among uncivilized people and in parts of the East the mother resumes her usual occupations immediately after parturition; but in civilized countries the woman is confined to her bed for a week or 10 days. In civilized countries, through a false shame, originating in the seventeenth century among the ladies of the court of Louis XIV of France, when male obstetricians attended women, parturient women, covered by a cloth, rested on their back, an unnatural position, as the muscles of the abdomen and pelvis cannot exert their full strength during labor. Before that time there had been in existence an obstetrical chair (first mentioned in the Bible). But still better than the sitting position is the standing or crouching position, if necessary with supports under the arms or attachments for the hands, which will allow the muscles full play. This upright or crouching position is found among so-called uncivilized people.

The Pathology of Pregnancy. While the pregnant woman is liable to disease equally with other individuals, there are certain disorders which are peculiarly apt to arise during gestation or are dependent on it. The teeth may undergo decay, owing to the fact that the mineral elements necessary for their nutrition are appropriated by the embryo. Constipation from both mechanical and sympathetic causes is a common disorder. The kidneys, owing to the increased functional activity demanded of them, not infrequently become diseased, as evidenced by the appearance of albumin in the urine. These organs failing in their function, poisonous products of metabolism accumulate in the blood, pronounced nervous symptoms, such as headaches, vomiting, and impairment of sight and hearing, appear, and if not relieved, uræmic convulsions (the so-called eclampsia) are induced, ending often in coma and death. Besides these and many other affections incident to pregnancy, there are certain chronic diseases which, by reason of the increased strain upon the vitality at this time, are likely to prove fatal. The heart normally undergoes a measure of hypertrophy in pregnant women in order to meet the increased demands of circulation. When, however, there exists chronic disease either of the substance or the valves of this organ, it may prove unequal to the strain. The danger from this condition increases with each succeeding pregnancy. When pulmonary tuberculosis exists in the mother, gestation in the majority of cases accelerates the progress of the disease. Infectious diseases, nerve reflects and chemicals may be carried through the vessels and nerves of the umbilical cord from the mother to the fœtus.

Pregnancy may be terminated at any time before the normal period of 280 days. When this occurs during the first six months it is called abortion or miscarriage; when it happens during the three succeeding months it is termed premature delivery. A fœtus born before the fifth month does not ordinarily survive. Abortion is always a serious accident, either from loss of blood, or blood poisoning and peritonitis. This is particularly the case in forcible or criminal abortion, in which the mortality is very high. Extra-uterine (ectopic, tubal, or abdominal) pregnancy occurs when the impregnated ovum fails to reach the interior of the uterus and lodges in the Fallopian tube or drops into the abdominal cavity. The fœtus develops in this situation, and unless the condition is recognized early and operated on, death is likely to occur during the third or fourth month from rupture of the tube, hemorrhage, and peritonitis. A similar condition of affairs takes place in what is termed "missed labor" when the fœtus fails to be expelled at term. Operation for tubal pregnancy was advocated by Tait, Veit, Mundé, and others, and is now a common procedure.

The progress of natural labor may be obstructed by certain conditions of the mother and child. In the former deformities of the bony pelvis, disease of the uterus resulting in rupture, and malposition of the placenta (placenta prævia) are the most important. The child may be too large, or ill-formed, or present abnormally. These abnormal conditions render necessary various obstetric operations. Among these are: the induction of abortion or premature labor when the mother's life is in danger or the size or shape of the bony pelvis is such as to preclude delivery at full term; the extraction of the child with forceps; the Cæsarean operation (delivering the child through an opening in the abdomen); version or turning when the fœtus presents abnormally or labor needs to be rapidly completed; and perforation of the head (craniotomy). The chief danger to which the woman is liable after delivery is puerperal or childbed fever, which is now known to be simply septicæmia (q.v.) or blood poisoning, due to infection from unclean hands, instruments, or appliances. Since the discovery of antisepsis childbed fever has been constantly on the decline and at present day is a comparatively infrequent complication, both in hospitals and private practice. Consult E. P. Davis, *Manual of Obstetrics* (Philadelphia, 1914). See ABORTION; EMBRYOLOGY, HUMAN; GESTATION; PELVIS; PHLEGMASIA ALBA DOLENS; TWILIGHT SLEEP.

OBVER'SION (from Lat. *obvertere*, to turn towards or against, from *ob*, before, towards + *vertere*, to turn). In logic, the process of transforming a judgment into one of opposite quality, i.e., affirmative into negative and vice versa. The change may be effected provided due compensation is made by changing the quality of the predicate. For example, "All men are mortal" becomes by obversion "No man is immortal." See the bibliography under Logic.

OCALA, ô-kä′lȧ. A city and the county seat of Marion Co., Fla., 101 miles south by west of Jacksonville, on the Oklawaha River and on the Atlantic Coast, the Ocala Northern, the Ocala and Southwestern, and the Seaboard Air lines (Map: Florida, D 2). The city has a Federal building for post office and district court, a splendid high-school building, country club, a hospital, Carnegie library, and the famous Silver Springs. Ocala is surrounded by one of the most productive sections of the State—a region interested largely in the growing of vegetables. It is the centre of extensive lumber, turpentine, lime, and phosphate interests, and has a crate mill, foundry and machine shops, kitchen-cabinet factory, etc. There is a public market, and the electric-light plant and water works are owned by the municipality. Pop., 1900, 3380; 1910, 4370.

O'CALLAGHAN, ô-kăl′ȧ-hȧn, Edmund Bailey (1797–1880). An American historical scholar and editor. He was born in Ireland and was educated in medicine in Paris. He removed to Canada in 1823 and practiced medicine in Quebec. Then he became interested in the Irish national movement, was one of the organizers of the Society of the Friends of Ireland and editor of its organ, the *Vindicator*. In 1836 he was elected to the Lower Canada Legislative Assembly as a supporter of Louis J. Papineau (q.v.). In the year following he took a leading part in the insurrection in Lower Canada (1837), and on the failure of the movement fled to the United States. Resuming practice in Albany, N. Y., he became greatly interested in the records of Colonial New York, and it was largely through his efforts that the work of publishing them was undertaken. His published works include: *History of New Netherlands* (1846); *Documentary History of the State of New York* (4 vols., 1849–51); *Documents Relating to the Colonial History of New York* (11 vols., 1855–61). The two latter series were edited by him with introductions and elaborate and careful notes. Consult Robert Christie, *History of Lower Canada* (6 vols., Quebec, 1848–55).

O'CALLAGHAN, John Cornelius (1805–83). An Irish historian, born in Dublin. He was educated for the law, but went into journalism. His edition of the secret history of the revolution in Ireland in 1688–91, written by Charles O'Kelly, an officer in the service of James II, and published under the title *Macariæ Excidium* (1846), is historically valuable. But his *History of the Irish Brigades in the Service of France* (1869), representing the labor of 25 years, is his most important work, and a standard one in its field, despite certain defects of style and substance.

OCAMPO. See Santa Barbara de Ocampo.

OCAÑA, ô-kän′yȧ. A town of the Department of Norte de Santander, Colombia, 235 miles north of Bogotá, on the upper courses of the Taira River. The town is situated in the midst of a fertile plain noted for its production of coffee, and in addition is the centre of a brisk trade between western Venezuela and the Magdalena valley in anise and hides. In the vicinity are deposits of coal and lead. Ocaña was founded in 1572. Pop., 1912, 16,814.

OCARINA, ŏk′ȧ-rē′nȧ (It., dim. of *oca*, goose; so called from its resemblance to a goose egg). A musical instrument of Tyrolese or Austrian origin, improved by French musicians. The ancient prototype of the ocarina is the Chinese hsüan, which was invented about 3000 B.C. The modern instrument was at first a molded piece of clay a few inches long, with holes for keys, a mouthpiece, and hollowed within. Five different sizes are now made for the different parts in music, and a piston at the end is used to temper the note. A row of keys in the improved instrument takes the place of the original holes.

O'CAROLAN, ô-kăr′ô-l*a*n, Turlogh (1670–1738). An Irish bard, and one of the last of his calling, born in Newtown, Meath. He was blind from the age of 16, and spent his life wandering through Ireland, singing to the accompaniment of his harp. Many of his songs, all of which were vigorously national in character, are still to be heard in parts of Ireland. A collection of his ballads was published during the eighteenth century, but others of them have been handed down by tradition among the peasantry. He died in Roscommon.

OC′CAM, William of, or William Ockham (?–c.1349). A famous schoolman, called *doctor singularis et invincibilis*. Little is known of his early life. There is some reason to believe that he was born at the village of Ockham in Surrey, England. He studied under Duns Scotus, took his bachelor's degree at Oxford, and afterward studied in Paris. He was a Franciscan, and about 1321 became involved in a controversy which arose in his order concerning the question whether Jesus and the Apostles owned property. A certain Narbonnese priest affirmed that the founders of the Christian religion had all things in common, and the doctrine was vigorously supported by William of Occam and other influential Franciscans, notwithstanding its condemnation by the Pope, John XXII. In 1328 Occam and the others escaped from imprisonment in Avignon and made their way to Munich, where they were received and protected by Louis, Holy Roman Emperor. The remainder of Occam's life was passed in that city, where he continued his dispute with the popes and labored to perfect his system of philosophy. Whether he ultimately became reconciled with the head of the Church is disputed. He died at the convent of his order in Munich in 1349 or shortly after that year. Occam's most important work was done in the field of logic and philosophy. His system is commonly classed as nominalism (q.v.), which had never before received so vigorously logical and rational a treatment. Only individual things exist; universals are not realities, but only inferences of the thinking mind. His fundamental principle is that "entities must not be unnecessarily multiplied." Occam's chief works upon logic were the *Summa Logices* and *Expositio Aurea super Totam Artem Veterem*. On philosophy and theology he wrote *Quæstiones* and *Summulæ in Octo Libros Physicorum; De Sacramento Altaris; De Corpore Christi; Quæstiones in Quattuor Libros Sententiarum*, based on Peter Lombard's *Sententiæ* and containing nearly the entire theology of Occam. His polemical writings against the Pope include the *Opus Nonaginta Dierum; De Dogmatibus Papæ Johannis XXII; Compendium Errorum Papæ; Defensorium contra Johannem Papam; Dialogus in*

Tres Partes Distinctus, Quarum Prima de Hæreticis, Secunda de Erroribus Johannis XXII, Tertia de Potestate Papæ, Conciliorum, et Imperatoris. There is no satisfactory edition of his works. Consult: W. A. Schreiber, *Die politischen und religiösen Doctrinen unter Ludwig dem Baier* (Landshut, 1858); T. M. Lindsey, "Occam and his Connexion with the Reformation," in *British Quarterly Review* (London, 1872); Ueberweg, *History of Philosophy* (Eng. trans., London, 1872–74); A. G. Little, *Grey Friars of Oxford* (Oxford, 1892), containing a bibliography; Hauck-Herzog, *Realencyclopädie für protestantische Theologie und Kirche*, vol. xiv (Leipzig, 1904).

OC'CANEE'CHI. An eastern tribe of Siouan stock, living, when first noted in history in 1670, in southern Virginia, having their chief town upon an island called by their name, at the confluence of the Staunton and Dan rivers, just above the present Clarksville. The principal trading paths between the northern and southern tribes of Virginia and the Carolinas crossed at this point, which fact made their language the general trade language throughout the region, while their town contained always a considerable reserve store of corn and skins. In 1676 they aided the Virginians against the invading northern Indians, but were repaid by being attacked in turn by the whites, determined to plunder the town. The Occaneechi repelled the attack, but with such heavy loss that they soon after abandoned their island settlement and retired southward into Carolina. In 1701 they were found living at the Occaneechi Hills, about the present Hillsboro, N. C., but evidently declining, and shortly afterward they united with the Saponi, Tutele, and one or two other broken tribes. Consult James Mooney, *Siouan Tribes of the East* (Washington, 1894).

OCCA'SIONALISM (from *occasional*, ML. *occasionalis*, relating to occasion, from Lat. *occasio*, opportunity, cause, occasion, from *occidere*, to fall, perish, set, from *ob*, before, towards + *cadere*, to fall, Skt. *sad*, to fall). The name given to the philosophical system devised by the school of Descartes (q.v.) for the purpose of explaining the interrelation between mind and matter. It is an obvious fact that certain actions or modifications of the body are preceded, accompanied, or followed by changes in the content of experience, or, as they may be called, by changes in the mental world, and vice versa. This fact, although it presents no difficulty to the popular conception of mind and matter, according to which each is supposed to act directly upon the other—body upon mind and mind upon body—has long furnished to philosophers a subject of much speculation because, accepting the principle that cause and effect must be similar, they could not conceive the possibility of any direct mutual interaction of substances so dissimilar as mind and body. More than one system has been devised for the explanation of the problem. According to the occasionalists the action of the mind is not, and cannot be, the cause of the corresponding action of the body. But they hold that whenever any action of the mind takes place, God directly produces, in connection with it and by reason of it, a corresponding action of the body, and conversely. This simply pushed the difficulty a step farther back. If mind cannot act upon matter, then God, conceived as mind, cannot act upon matter; but, conceived as other than mind, cannot act upon mind. (See Geulincx, the leading occasionalist; Preëstablished Harmony.) Radical empiricism (q.v.) is one of the recent proposals to solve the problem thus raised; it solves the problem by denying the fundamental difference between mind and matter. Kant anticipated this solution in his discussion of rational psychology in his *Critique of Pure Reason* (pp. 381 ff. of the first edition).

OCCLEVE, ŏk'klēv, Thomas. An early English poet and man of law. See Hoccleve, Thomas.

OCCLU'SION (from Lat. *occludere*, to shut up, from *ob*, before, towards + *claudere*, to shut; probably connected with OHG. *sliozan*, Ger. *schliessen*, to close, provincial Eng. *clot*, bolt, and with Gk. *κλαίειν*, *klaiein*, to close). A special case of absorption (q.v.). The word is used to express the fact that gases are absorbed by solids. Sometimes it is a true solution, as in the case of hydrogen and palladium, carbon dioxide, and cast iron; at other times it is a condensation on the surface or within the pores, as in the case of charcoal and ammonia or oxygen.

OCCOM, ŏk'om, or **OCCUM,** Sam(p)son (c.1723–92). An American Indian preacher and missionary. He was born at Mohegan, Conn., and was converted during the religious revivals of 1739–40. He acquired some ability to read and, desiring to serve as missionary to his tribe, at the age of 19 entered an Indian school kept by Rev. Eleazar Wheelock, of Lebanon. After four years' study he opened a school at New London, but later went to Montauk, L. I., and taught among the Indians for 10 years. He became a member of the Suffolk presbytery in 1759. In 1761 a Scottish missionary society sent him as a missionary to the Oneida Indians; in 1765–66 he went to England with the Rev. Nathaniel Whitaker to raise funds for Moor's Indian charity school, and while there preached in many parts of England and secured nearly £10,000. The school thus reënforced was subsequently transferred to New Hampshire and became the nucleus of Dartmouth College. The latter part of his life was occupied mainly with missionary work among the Indians of central New York. He died at New Stockbridge, N. Y. For his account of the Montauk Indians, consult the *Massachusetts Historical Society's Collections*, 1st series, vol. x. He published a hymn book (1774). The hymn "Awaked by Sinai's awful sound" is attributed to him.

OC'CULTA'TION (Lat. *occultatio*, concealment, from *occultare*, to conceal, from *occulere*, to cover, from *ob*, before, towards + *calere*, connected with *celare*, to hide). A term used in astronomy. When the moon, in the course of her orbital motion around the earth, passes between us and a star or planet, the latter is said to be *occulted.* The phenomenon is thus quite analogous to eclipses. Observations of the exact instant when occultations occur were formerly used to determine the longitudes of places on the earth, but this is now done more accurately by telegraphing time signals, and the principal use of modern occultation observations is to determine the angular diameter of the moon. This is done by observing the exact times when certain stars disappear behind the moon and also the exact moments when the same stars reappear. From these observed data we can determine the moon's angular diameter by a process of calculation. See Eclipse.

OC'CULTISM (from *occult*, from Lat. *occultus*, hidden, p.p. of *occulere*, to conceal). An occult property of matter is, in mediæval phraseology, a property that requires to be made manifest by experimentation, and occult science is simply experimental science. As such science was the occupation of the few, and was not seldom suspect to the reigning theology, the word "occult" gradually assumed the significance that it now possesses, of something magical or uncanny or supernormal. See MAGIC; SPIRITUALISM; THEOSOPHY.

OC'CUPANCY (from Lat. *occupare*, to occupy, from *ob*, before, towards + *capere*, to take). A mode of acquiring title to property by taking possession of an unappropriated corporeal thing with the intention of becoming its owner. This mode of acquiring property came into the common law from the Roman civil law, which considered occupancy a mode of acquiring property belonging to no one but subject to appropriation by the first comer. The finder of unclaimed lost goods has a title to them by occupancy. So has the captor of beasts of a wild nature so long as he keeps possession of them, but there can be no complete property in them till they are domesticated; and if they make good their escape, with no probability of their return, the ownership of the original owner ceases, and their next captor acquires a good title to them by occupancy. But if they be once domesticated the title by occupation becomes indefeasible. The owner of property by accession (q.v.) acquires his title by occupancy, and so does the owner of goods obtained by confusion (q.v.); it being held that where a person with fraudulent intent mixes his property indistinguishably with that of another, the latter is not compelled to distinguish his property from that of the former, but is entitled to the ownership of the whole. Blackstone refers the title to literary property to the head of occupancy, and here also belongs the title to trade marks, which is acquired by a person using such marks to indicate his ownership of certain articles or of certain business.

The acquisition of title to land by occupancy is also recognized by the law. At the common law, if one seised of land for the life of another (called by the Norman-French term "tenant *pur auter vie*") died before the person by whose life the estate was measured (known as the *cestui que vie*), the first person to take possession became entitled to the land as general occupant, unless in the conveyance creating the estate a person (known as the special occupant) was designated to take it. General and special occupancy have now, however, been done away with by statutes providing that what is thus left of an estate *pur auter vie* shall go to the heir or personal representative of the life tenant.

Land left bare by the gradual action of the sea, or deposited by a river, becomes by occupancy the property of the owner of the upland to which it becomes attached. (See ACCRETION.) While the United States was a Colony of Great Britain the ownership of land was held to be vested in the crown and individual titles to land were derived from the crown. Since the separation of the Colonies from Great Britain titles are derived from the grant of the United States or the individual States. The right of the discoverer of uninhabited lands to assume jurisdiction over them is to be referred to the same general principle of title by occupancy. See REAL PROPERTY; TITLE; and consult the authorities there given.

OCCUPATION. See OCCUPANCY.

OCCUPA'TIONAL, or INDUSTRIAL, DISEASES. Maladies due to specific poisons, mechanical or chemical irritants, physical or mental strain, or faulty environment and resulting from specific conditions of labor. (Thompson.) The wide variety of diseases associated with the so-called dangerous trades is largely incident to the industrial development of the last century, although ancient and mediæval writers were by no means unobservant of the fact that certain occupations produced particular diseases. In the great civilizations of antiquity there was often a sufficient concentration of masses of laborers to produce what Pliny denominated slave diseases. In the Middle Ages the safeguarding of workers was mostly in the hands of guilds, and scattered records show that the regulation of various handicrafts was even then deemed necessary and had a remedial effect. One of the most interesting treatises on the subject was that of Ramazzini, published in Modena, Italy, in 1670 and entitled *De Morbis Artificum Diatriba*, an English edition of which, *Treatise of the Diseases of Tradesmen*, appeared in 1775.

It was in the early years of the nineteenth century, when steam power began to be used and machinery to be substituted for hand labor, with the brutal exploitation of women and children which rapidly ensued, that the necessity for governmental oversight of factory labor became insistent. In this matter Germany, France, Belgium, and other continental states have been somewhat in advance of England, yet the report of an English royal commission in 1838 furnished the stimulus for the enactment of laws for factory inspection and industrial regulation on the Continent. Definite systems of factory inspection, together with varying degrees of sanitary regulation, were enacted into law in Denmark in 1873, in France in 1874, in Switzerland and Germany in 1878, in Austria in 1887, and in Belgium, Holland, and Sweden in 1888–89. The landmarks of English factory legislation are the Acts of 1802 and 1833, the former designed to deal with the health and morals of apprentices in cotton mills, the latter regulating the labor of minors in the textile trades generally. In 1842, following the shocking revelations of a royal commission of the previous year, women and girls were excluded from underground mining, but it was not until 1865 that proper safeguards were thrown around this dangerous vocation. In 1844 the Act of 1833 was revised, and since that time laws have been passed at frequent intervals as necessity and social economics demanded. It is only in comparatively late years, however, that a full realization was reached of the important part played by occupation as a factor in diseases and the still more important fact that most of such diseases are preventable. In Germany many valuable studies of the subject have been made, hygienic institutes and museums abound, and state oversight is strict. In Frankfort-on-the-Main a new Institute for Industrial Hygiene was inaugurated in 1910. Other similar institutions exist in Vienna (founded in 1909), Berlin (1904), Budapest, Munich, and several other large cities. In Italy, at Milan, there is a clinic and hospital, opened in 1910, for occupational diseases exclusively.

In the United States it was not until 1910 that any authoritative study or comprehensive legislation was attempted, although we find as far back as 1867 that factory conditions, especially in regard to hours of labor, were investigated by a special commission in Massachusetts. Detached studies of industries, particularly those involving the use of lead, were published in different States, and finally in June, 1910, the first National Conference on Industrial Diseases met in Chicago, and a memorial was sent to President Taft pointing out that there occurred annually in the United States 13,400,000 cases of sickness among artisans and craftsmen, many of which were directly attributable to occupation. In 1915 the movement was steadily gathering force. The Bureau of the Census issued a partial classification for the grouping of death returns, taking cognizance of 101 diseases due to hazardous callings. Illinois and New York established State commissions to investigate the problems of industrial hazard in detail. The following States required the reporting of certain occupational diseases by physicians: California, Connecticut, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, and Wisconsin. In 1915 the department of health of New York City created a division of industrial hygiene to make a general industrial survey of working conditions in that city. A number of independent organizations have special committees for the study of industrial diseases, among which may be mentioned the New York Academy of Economic and Social Science, the New York branch of the American Chemical Society, and the New York Association for Labor Legislation.

Industrial diseases are modified in their occurrence among workers by race, age, sex, habit, individual fitness or unfitness, alcoholism, etc. They may be acute or chronic, may occasion immediate death, may result in incapacity, brief or permanent, or merely act as a predisposing cause of sickness. It is to be remembered, also, that many occupations expose the workers to several distinct hazards. For example, brass workers are exposed to the dangers of poisoning by lead, brass, and emery dust, mineral acids, potash and cyanide fumes, wood alcohol and benzine, as well as to conditions of excessive heat and moisture.

The best classification is that of Thompson, who divides occupational diseases into (1) diseases due to irritant substances; (2) those due to harmful environment; and (3) special occupational diseases.

Diseases Due to Irritant Substances are subdivided into those dependent on the absorption of (*a*) toxic metals and their compounds; (*b*) toxic gases, vapors, and fumes; (*c*) toxic fluids; (*d*) irritant dusts and fibres; (*e*) germs; and (*f*) miscellaneous irritants.

Toxic Metals and their Compounds. These are innumerable, and only a few of them can be noticed here. *Antimony* (q.v.) is used in making type, stereotypes, alloys, hardening lead for ammunition, making fireworks, vulcanizing, etc., and in cotton dyeing and textile printing. The metal may be absorbed as a vapor, in dust, and through the skin and alimentary canal. *Arsenic* (q.v.) is used in 30 or more trades as a powder, solution, and in various compounds. Workers exposed to its influence are those engaged in the industries of mining or smelting arsenical ores, manufacturing paints and colors, tanning, dyeing, and glassmaking. Acute *brass poisoning*, or brassfounder's ague, was first described by Thackrah in 1830. Hayhurst states that from 70 to 80 per cent of all brassfounders are subject to this ague, but that tolerance is established in a large proportion of them. This acute form of brass poisoning is due to inhaling the fumes. There is also a chronic form, dependent on the inhalation of brass dust. *Lead poisoning* is one of the oldest known occupational diseases. Hippocrates was familiar with it, and it is said that Raphael, Correggio, and Michelangelo acquired plumbism from mixing their own paints. At the present time more than 150 trades expose the workers to this hazard. Among the most important of these are lead mining and smelting, the making of alloys, the manufacture of white and red lead, paints, and colors, type founding, shot making, and glass blowing. More than 25,000 persons are employed in the United States in these industries. (See LEAD.) *Mercury* (q.v.), both in metallic form and in its numerous compounds, ranks with phosphorus and lead as one of the most poisonous of all the metals used in industrial processes. It is absorbed readily as a vapor and easily penetrates the skin and mucous membranes. Quicksilver miners suffer most severely, and formerly next to them were mirror makers, until the process of backing mirrors with quicksilver was largely superseded by the use of silver nitrate. Other processes into which mercury enters are the making of incandescent lamps and X-ray bulbs, coloring artificial flowers, making hair dyes and cosmetics, and the manufacture of felt hats. Nickel, platinum, silver, tin, vanadium, and zinc (qq.v.) give rise to poisonous symptoms at times.

Toxic Gases, Vapors, and Fumes are thus summarized by Baskerville: "The usual gases which give rise to complaint in manufacturing localities are the following: chlorine, which is emitted by pottery kilns and ceramic-products manufactories, and from plants for the electrolysis of halids; hydrogen chloride, which is produced by the combustion of coal, and by pottery kilns, ceramic-products manufactories (partly from the coal and partly from the clay), nickel and cobalt smelting, platinum refining, glass manufactories, fertilizer manufactories, the chloride of lime industry, and alkali manufactories; sulphur dioxide and sulphuric acid, which result from the combustion of coal, coke, petroleum, and gas, copper smelting, bleaching operations, etc.; fluorides and hydrofluoric acid, which are emitted from acid phosphate and heavy chemical plants; hydrogen sulphide, from chemical works, especially those which produce ammonia; carbon monoxide, which is emitted from iron furnaces and from copper smelters; organic vapors, from, e.g., glue refineries, bone burners, slaughter and packing houses; zinc fumes, from zinc smelters and from brassfoundries; arsenical fumes, from copper smelters; phosphorous fumes, from match manufactories; and carbon disulphide and sulphur chloride, from some rubber works."

Among the vapors which require particular mention are those of *aniline*, a highly toxic volatile substance distilled from coal tar or benzine. It may be absorbed either through the respiratory or alimentary canal and through the unbroken skin. Its effects are observed chiefly among workers in color factories, textile industries, dyeing works, and makers of wall paper and artificial flowers. The victims of severe aniline poisoning often die, and mild acute cases and cases of chronic poisoning are very common, especially in Germany. (See Aniline Poisoning.) *Carbon dioxide* in its natural state constitutes a hazard among miners, by whom it is known as choke damp. As an artificial product it is often manufactured in dangerous quantities, during the process of fermentation in sugar refineries, starch factories, and beer vats, and in paper mills, limekilns, charcoal pits, and silos. Five per cent of this gas in the air may be breathed without danger, but 10 per cent gives rise to symptoms of dyspnœa and asphyxia which prove fatal in about 25 per cent of the cases. *Carbon monoxide* and illuminating gas constitute a hazard in cement and brick works, in industries involving the use of charcoal or gas stoves, in blast furnaces, and many other situations. In Vienna 48 per cent of gas-house workers are said to suffer illness during the year; in Berlin the percentage is given as 34; but these men are also subjected to abrupt changes of temperature, to inhaling coal dust, smoke, and a variety of toxic gases. The manufacture of water gas is shown by Sedgwick to be much more harmful than that of making the old-fashioned illuminating gas. *Chlorine* and its compounds are extensively used, and the gas is very irritating and injurious when it exists in any amount over one-fifth part per 100,000 of inhaled air. The chief industry in which chlorine is liberated is the manufacture of chloride of lime, but the preparation of Javelle water, glazing bricks, making of wall paper and writing paper, and the compression of the gas in cylinders for commercial use all liberate much chlorine. Symptoms of acute poisoning are rapid suffocation and cyanosis, with great prostration, and speedy death. Chronic poisoning gives rise to bronchial irritation, anæmia, wasting, decay of the teeth, and irritation of the skin. *Hydrocyanic acid* (Prussic acid) and its compounds are among the most rapid and deadly poisons known. Large doses either of the vapor or the acid or its compounds are instantly fatal. Artisans most subject to this poisoning are photographers, makers of coal gas, of red prussiate pigments, fulminate of mercury, and potassium ferrocyanide. *Methyl alcohol*, or wood alcohol, is extensively used as a solvent in industrial processes and is employed illegally as a substitute for grain alcohol in cosmetic preparations and alcoholic drinks. Its fumes are very deadly, and the substance itself has been responsible for so many cases of fatal poisoning and of blindness that strict regulation of its use has been enforced in Europe and the United States. A considerable number of cases of fatal poisoning have been reported from inhaling the fumes of wood alcohol in confined spaces. Under such circumstances the vapor was believed to be in a very concentrated form. According to recent investigations by Loewy and Von der Heide at the Royal Agricultural College in Berlin it is proved that relatively small quantities of the fumes may produce chronic poisoning; amounts as low as 0.2 per cent in the inspired air may lead to absorption, which, though slow, none the less produces saturation of the organism with the alcohol. According to the *Journal of the American Medical Association* nearly 1000 cases of poisoning have been reported since 1893, the date when methyl alcohol of a high degree of purity began to be made. The *Journal of Industrial Engineering and Chemistry* states that the business of manufacturing methyl alcohol amounts to about 10,000,000 gallons annually, over 3000 workers being employed in this industry alone. In 1915 there were 63 manufacturers of wood alcohol in the United States. According to Tyson 2,000,000 people were using it in various trades. *Phosphorus* (q.v.) is used or prepared in the extraction of mineral phosphate of lime from bone, in making phosphorus bronze, certain dyes, and, most important, in the manufacture of matches. It is in the last-named industry that its dangers have been chiefly exhibited. White phosphorus was discovered by Brandt in 1609, red phosphorus 236 years later by Schrötter. White phosphorus is volatile at the ordinary temperature and is highly toxic and inflammable, whereas red phosphorus is not volatile and not poisonous except in very large doses. It is the white variety, so largely used until very recent years in the manufacture of matches, that made this industry one of the most dangerous of all trades. The first statutory prohibitions against the use of white phosphorus in the manufacture of matches were made in Finland in 1872 and in Denmark in 1874, with the result that poisoning in this industry was eradicated from these countries. France prohibited the use of white phosphorus in matches in the year 1897, since which time not a single case of phosphorus poisoning has been reported. Switzerland interdicted it in 1898 and the Netherlands in 1901. Still later (1905) a treaty prohibiting the making and selling of white-phosphorus matches was signed in 1906 by France, Germany, Denmark, Italy, Switzerland, the Netherlands, and Luxemburg; in 1908 by Great Britain, in 1909 by Austria, and in 1910 by Canada. In the United States, under a law which took effect in July, 1912, manufacturers of white-phosphorus matches are taxed $1000 a year, whereas the manufacture of any other kind of matches entails only a tax of $50 per annum; furthermore white-phosphorus matches themselves are subject to a prohibitive tax of one cent per hundred. The importation of white-phosphorus matches is prohibited. Workers in phosphorus are subject to chronic poisoning, which consists almost entirely of necrosis of the jaw (phossy jaw). The process begins in the sockets of the teeth and extends until the whole jaw or large portions of it are cast off. Necrosis attacks those whose teeth are in bad condition, and phosphorus workers should be subjected to periodical examination to insure sound teeth. General disturbance of health without necrosis may occur. A notable fact is that necrosis may appear years after the individual has ceased to work in phosphorus.

Toxic Fluids. The principal examples of these are the mineral acids, chinine, chinone, metol, nitroglycerin, paraffin, petroleum, tar, and pitch. *Nitroglycerin* (q.v.) is a colorless, oily, volatile fluid used in medicine and in making dynamite and other high explosives. Upward of 250,000,000 pounds of dynamite are manufactured annually in the United States, and the dangers to which it gives rise, as a rule, are those due to accidental explosions; but the substance also produces symptoms of poisoning in those who merely handle giant powder and other explosives. Nitroglycerin gains access to the body by inhalation, through the alimentary canal, and through the skin. Certain persons are so susceptible that they may absorb a sufficient amount to produce fullness and throbbing in the head by merely shaking hands with a workman who has been handling giant powder. *Petroleum* gives rise to an acute form of poisoning known as petroleum intoxication, which consists in a sudden weakness of the legs, and dyspnœa, followed, in fatal cases, by coma and asphyxia. The chief sufferers are workmen employed in petroleum wells and in cleaning out petroleum tanks. Long-continued contact with petroleum is apt to result in various skin eruptions and respiratory diseases.

Irritant Dusts and Fibres. Dusts in general may act merely as mechanical irritants or exhibit their deleterious action through the poisonous materials they carry. They are classified into mineral, mechanical, vegetable, and animal dusts. Dust containing large particles is more dangerous than the finer variety because the heavier particles are carried further into the lungs, these organs being chiefly attacked. Workers in dusty trades fall easy victims to tuberculosis. The mortality of the latter disease as affecting workers in dusty trades has been extensively investigated and is found to be about double the normal rate. According to statistics of the United States Bureau of Labor (1908–09), among males from 25 to 34 years of age in all occupations the mortality from tuberculosis was 31 per cent of the total, but estimated by selected trades the rates were as follows: grinders, 71 per cent; tool makers, 59 per cent; printers, 56 per cent; stonecutters and weavers, 50 per cent; woolen-mill workers, 44 per cent. According to the report of the New York State Bureau of Labor for 1906, pulmonary tuberculosis was the leading disease in 78 per cent of the trades enumerated. The death rate was highest among marble and stone cutters, in whom the mortality was 5.40 per 1000; next came cigar makers and tobacco workers, with a rate of 4.79 per 1000; printers, 4.35; tinners, 3.65; and butchers, 2.87. Shoemakers, machinists, and millers suffered least, the rates being 1.35, 1.95, and 1.98 respectively. The quantity of dust which may exist in the atmosphere in the neighborhood of various mills and factories is almost incredible, and workers are exposed not only during their hours of labor, but in their homes, which usually are near the factories, to the deleterious action of dust. The extent to which air may vary in its dust content is shown by contrasting items taken from a table compiled by Friese. According to this table mountain air with a sea breeze blowing contains 72 particles of dust per cubic millimeter, whereas London and Paris air contain from 300,000 to 500,000 particles; fresh country air contains about 500; an audience chamber before a meeting 175,000 and after the meeting 400,000. Among the insoluble inorganic dusts may be mentioned those of asphalt, cement, diamonds and other precious stones, emery, glass, mineral wool, meerschaum, metal filings, and various stones and earths, such as carbon, sand, and silica. Among the organic dusts and fibres the most important are acridine; ashes and street dust; carpet dust, cotton, feathers, felt, flax, and hemp; fur, grain, and flour; horn, bone, and shell; horsehair, jute, straw, and broom; sugar; tobacco; and wool. The dust of fur is particularly irritating and may contain pathological germs.

Germs. Among the germs (aside from the tubercle bacilli) especially associated with occupation are those of ankylostomiasis, or hookworm disease, which is fully described under the latter title; anthrax (q.v.), or woolsorter's disease, occurring in the tanning, wool, and brush industries; foot-and-mouth disease, occasionally attacking butchers, cowboys, and horse handlers in general; and glanders and farcy, rarely transmitted to the same class of persons.

Diseases Due to Harmful Environment. Caisson disease, or compressed-air illness, occurs in tunnel and caisson workers and is described under its own title. Caissons were first used by Triger in mining at Chalons, France, in 1839. There are a vast number of caisson workers employed in bridge building and tunneling, and the disease (familiarly known as the bends) is of frequent occurrence at the present time. In constructing the Eads Bridge across the Mississippi River at St. Louis, 600 caisson workers were employed, 20 per cent of whom suffered from the bends, and 14 died.

Divers, like caisson workers, suffer from compressed-air illness, being subject to abrupt changes in atmospheric pressure. Deep-sea diving involves the wearing of an apparatus called a scaphander, consisting of a helmet and metal corselet fastened to a rubber suit and connected with tubes running to the surface. Every 10 meters of sea water, or approximately 38 feet of depth, corresponds to an increase of one atmosphere of air pressure—about 15 pounds per square inch. In fresh water the pressure is 34 feet of water to one atmosphere. If the air is not compressed in the proper ratio, breathing becomes impossible. Flégel, of Vienna, has made a special study of Mediterranean sponge fishing. According to him the mortality is very high in this industry, the diving suits and pumps being frequently in charge of careless or incompetent men. The yearly mortality among those wearing diving apparatus is about 20 per cent and the morbidity 25 per cent. Flégel quotes Petros Zotos, commander of a Greek war vessel assigned to superintend the diving industry, as asserting that of 900 Greek divers, using 140 scaphanders, more than 100 die in a single summer's fishing. Samos and Turkey have laws prohibiting the use of scaphanders in sponge fishing, but the United States merely prohibits their use in certain months of the year and in depths of less than 50 feet, in which the sponges are easily obtainable by other methods. The Russian and British navies maintain diving schools in order to familiarize the men with the diving apparatus and so lessen the hazard. In 1914 Queen Olga of Greece founded a hospital in Tripoli for the treatment of divers in the neighboring waters, more than 600 of whom are Greeks. Dr. Leonard Hill has devised a self-acting diving outfit carrying cylinders of compressed oxygen with a caustic-soda chamber, which renders the diver independent of air pumps and tubes. Such an apparatus may be used for half an hour at a depth of 100 feet.

The effects of rarefied air are seen among professional balloonists and aviators; they are similar to those observed in mountain climbers and were first described by De Costa in the fifteenth century under the name of malades montagnes, or mountain sicknesses. Rapid air ascensions may be safely made to 9000 feet or more in half an hour, and the return made in

5 to 7 minutes. Aviators are subjected simultaneously to abrupt changes of temperature of 20° F. to 30° F. The symptoms during the ascent are vertigo, ringing in the ears, deafness and frontal headache, and chilliness. On returning to the earth there are evidences of fatigue and nerve tension. The face is flushed, the eyes suffused, and the pulse rapid. At great heights hemorrhages may occur from the nose, eyes, or ears. These effects are evanescent, and considerable immunity may be acquired. Miners, quarrymen, and gunners are liable to the effects of air concussion, the chief among which are rupture of the eardrums, permanent deafness from labyrinthine hemorrhage, together with tinnitus and headache.

Temperature modifications are habitually experienced by firemen, cooks, and foundrymen, which, accompanied by excessive moisture, produce characteristic symptoms. Temporary exposure to dry air may be endured up to 180° F. or higher. In the stokeholes of steel warships the temperature rises to 130° F. or 140° F., especially in the tropics. The abrupt changes in heat and moisture result sometimes in acute heat stroke (q.v.) or insolation. Painful cramps of the legs and abdomen are sometimes experienced.

Light modifications are productive of pathological conditions, which become a serious factor in many occupations. X-ray and radium burns are comparatively new phenomena. They are apt to be slow in their development and equally slow in healing and sometimes give rise to a form of cancer. The most common effects of intense light are seen in blast and steel furnaces, where the excessive light is accompanied by temperatures ranging from 1800° F. to 3200° F. The workmen become accustomed to looking with the naked eye into furnaces up to a temperature of 2000° F., but higher temperatures require dark-blue glasses, and still higher temperatures necessitate the use of a spectroscope. Cataract occurs among these workers, in glass blowers, and in puddlemen in foundries. Electric-arc drilling is associated with a temperature sometimes of 7000° F., but the flashes are intermittent. Helmets, shields, or screens made with several alternate layers of blue and red glass are worn in this work. The improper illumination of workrooms has a deleterious effect not only on the eyes, but upon the general health, especially when operatives have to work with artificial light furnished by incandescent electric bulbs on a level with the eyes. There is hyperæsthesia of the retina, chronic inflammation of the eyelids, and visual disturbances ranging from mere dimness of sight to serious impairment of the optic nerve. In the United States, up to 1911, in only 11 States was there regulation of factory lighting.

Special Occupational Diseases. *Occupational Diseases Involving the Nervous System.*—Many of these disorders are described under their own titles. The question of general fatigue has received comprehensive study by Josephine Goldmark, in her treatise on *Fatigue and Efficiency* (New York, 1912). The effects of fatigue have been very noticeable of recent years among mill and factory operatives in the textile industries, where complicated and rapidly moving machinery requires close attention on the part of the workmen and entails considerable physical and mental strain. Fatigue is known to diminish the general resistance of the body and render it vulnerable to infectious diseases such as grippe, pneumonia, and tuberculosis, besides interfering with digestion and nutrition. Another result of general fatigue is the increased frequency of accidents from machinery due to lowered alertness of the operative.

Each new form of mechanical invention entails its own occupational neurosis. In general these maladies may be summarized as neuritis, neuralgia, wasting of muscles or groups of muscles, and cramps, together with sensory disturbances. See NEUROSIS.

Prophylaxis. Prophylaxis must be adapted to fit each hazardous employment. In general an important feature of prevention is the education of the individual worker in personal cleanliness and sanitation as well as in the particular dangers incident to his own trade. Equally necessary is the education of the employer in the direction of maintaining clean, properly lighted, and well-ventilated workrooms, providing facilities for bathing, sanitary toilets, and appliances designed to protect the worker against the particular hazard to which he is subjected. The regulation of humidity in its relation to temperature is of exceptional importance and has received legislative attention. The removal of dust is also a great problem in trades involving its production. It is removed by various suction appliances, generally operated on the vacuum principle, by which air currents pass continually away from the workman. Additional protection is afforded by masks and respirators, of which there are fully 40 types. These do not furnish absolute, but only relative protection. Of interest in this connection are the investigations of Schlablowski, who tested 37 different kinds of respirators and masks; 26 of these excluded about two-thirds of the dust and some of the others only about 10 per cent. In other industries, such as sand blasting, helmets with masks are worn. Physical examination of each workman to determine his fitness for a particular occupation, thus safeguarding him against undue risk, is now widely advocated.

In conclusion it may be said that there is a growing tendency towards strict governmental oversight and regulation of dangerous trades. As an example of what intelligent legislation will accomplish we may cite the experiences of several countries in regulating the industries involving the use of lead. In England, according to Hamilton, regulation had the effect of reducing the number of lead poisoning cases 50 per cent. In Newcastle these cases have been reduced to one among 276 workmen, whereas in Illinois, before restrictive legislation was passed, the ratio was one case in every seven men. In Germany lead smelting before 1885 was unregulated, and 73 per cent of the workmen acquired plumbism; during the following seven years, under strict governmental inspection, the incidence of lead poisoning was reduced to 0.8 per cent. In Austria the proportion was 6 per cent with and 43 per cent without governmental control. See ANTIDOTE; PNEUMOCONIOSIS; TOXICOLOGY; WORKMEN'S COMPENSATION.

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OCCUPATION NEUROSIS. A nervous condition characterized by a partial paralysis, pain, or spasm due to excessive fatigue of a set of muscles which have been subjected to overuse; muscle tire. Among occupation neuroses are chorea scriptorum, or writer's cramp, telegrapher's cramp, etc. See NEUROSIS; OCCUPATIONAL DISEASES.

OCEAN (OF. *ocean*, Fr. *océan*, from Lat. *oceanus*, from Gk. *ὠκεανός*, *ōkeanos*, ocean; connected with Skt. *āśayana*, ocean, from *ā*, towards + *śī*, to lie). The great expanse of salt water occupying the larger depressions of the earth's surface. With the rivers and lakes it constitutes the water envelope or hydrosphere between the gaseous atmosphere and the solid lithosphere. Continental lands lie mostly in one hemisphere and may be regarded as large islands and peninsulas, while the ocean is a continuous water body communicating throughout its entire area. The relative proportion between the land and water surfaces has not been accurately determined as there are still unexplored areas in the Arctic and Antarctic regions, but, using the proportion for the known parts of the earth, it is estimated that the ocean covers 71 per cent of the entire surface, or approximately 140,000,000 square miles. With an estimated average depth of 2¼ miles the ocean's volume is 315,000,000 cubic miles.

Divisions of the Ocean. The continents which are massed as great triangles within the hemisphere having southern England for its pole separate the included portion of the hydrosphere into three broad arms—the Atlantic Ocean, between America and Europe-Africa; the Pacific Ocean, between America and Asia-Australia; and the Indian Ocean, between Asia-Australia and Africa. Of these the Atlantic and Pacific communicate at their northern extremities through the Arctic Sea, which may be regarded as an extension of the Atlantic basin. The three oceans are further divided into northern and southern parts by the equator, but this division is conventional and not based upon physical grounds. Southward, beyond the limits of the continents, they open out into a vast expanse of shoreless water to which the name Southern Ocean may be conveniently given, the Antarctic Ocean being restricted to the area within the Antarctic circle. The areas and average depths of the larger arms of the ocean, not taking into account the marginal seas and mediterraneans, are approximately:

OCEANS	Depth, feet	Area, sq. miles
Pacific	13,438	64,065,000
Atlantic	13,654	31,520,000
Indian	12,887	28,348,000
Arctic	3,837	5,540,000

The borders of the ocean are often partially shut in by chains of islands or they form deep reëntrants into the continental lands, and such portions may have distinctive physical features. The mediterraneans, illustrated by the classic Mediterranean and the Gulf of Mexico, are inclosed seas, communicating with the ocean only by narrow passages; their depths range from 1000 to 2000 fathoms and over limited areas even exceed the latter figure. Marginal or fringing seas, partially inclosed by island groups, include waters of great depth like the Yellow Sea and the Japan Sea, and shallower bodies like the North Sea. Deep reëntrants on continental borders with broad openings towards the main ocean are illustrated by the Bay of Biscay and the Gulf of Guinea.

Ocean Floor. The ocean basins are vast depressions whose surface rises and falls in gentle undulations. Throughout most of its extent the bottom lies at depths exceeding 2000 fathoms, and there are many depressions or deeps lying below 3000 fathoms. The greatest depth yet reported is 5269 fathoms, or 31,614 feet, in the Pacific near the island of Guam. Soundings of 5155 and 5147 fathoms have been obtained in the same ocean, while the greatest known depth of the Atlantic is 4561 fathoms off the coast of Porto Rico. In the deeper or pelagic regions the floor consists of soft oozes, formed from the calcareous shells of minute animals living near the ocean surface and from volcanic dust. The most widespread deposit is globigerina ooze, an accumulation of fossil casts of foraminifera. When the depths exceed 2500 fathoms, however, the calcareous shells are dissolved by the water, and there remain only the siliceous remnants and volcanic materials, which accumulate very slowly over the floor as red clay. On the borders of the continents the ocean sometimes overlaps the land in a broad belt of shallow water whose floor is commonly called the continental shelf; here the depths do not often exceed 100 fathoms for considerable distances offshore, and the bottom consists of sand and clays that have been derived from the adjacent land surface by the erosive and transporting action of rivers. The littoral islands are mostly located on such platforms, which are prominent on the eastern coast of America, the western coast of Europe, and the southwestern coast of Asia. The deeper ocean is almost free from large islands, although by volcanic activity many small islands have been built up from great depths, as in the South Pacific. See DEEP-SEA EXPLORATION.

Ocean Water. By the continuous process of interchange between the surface waters of the land and the ocean the latter has become a depository of vast quantities of mineral matter that have been dissolved out of rocks through the agency of springs and streams. The principal constituents of sea water are the more soluble salts—the chlorides and sulphates of the alkalies and alkaline earths. The less easily soluble compounds, although playing a much more important rôle in the formation of rocks, are present in sea water in only minute quantities. On the average 100 parts of water contain 3.5 parts of solid materials whose composition is about as follows: sodium chloride, 77.76 per cent; magnesium chloride, 10.88 per cent; magnesium sulphate, 4.74 per cent; calcium sulphate, 3.60 per cent, potassium sulphate, 2.46 per cent; magnesium bromide, 0.22 per cent; calcium carbonate, 0.34 per cent. Small amounts of various other substances, including silicon, phosphorus, fluorine, iodine, boron, aluminium, barium, strontium, manganese, iron, copper,

nickel, lead, and even of the much rarer metals, gold and silver, are also known to be present. The slight portion of dissolved calcium carbonate is of great importance to marine life, being the source from which the corals and shell-building organisms derive their supplies of lime. The amount of salts dissolved in the water varies in different localities, though the range of such variation is small. In regions of heavy rainfall, such as the equatorial calms, and off the mouths of large rivers, the salinity is lowered, as it is also in high latitudes, where evaporation takes place slowly. On the other hand the waters of inclosed seas, like the Red Sea and the Mediterranean, and of trade-wind belts which receive little precipitation and are subject to rapid evaporation, are slightly above the average in salinity.

The freezing point for sea water of average salinity is 28.6° F., which is also the point of maximum density, while fresh water attains its greatest density at 39° F. As the surface of the ocean is cooled its density increases steadily, so that the upper layers by sinking distribute the low temperature throughout the mass. Owing to the ocean currents, which tend to equalize the temperatures, and to chemical changes, which lower the freezing point, the ocean, however, never freezes solid even in the coldest regions. Its surface waters show a smaller range of temperature than does the air over it and much smaller than the land in the same latitudes. This tendency to preserve an equable temperature has great influence upon the climate, especially as it tempers the winds which blow over its surface. In the polar regions, when the surface waters are freezing, the minimum temperature is somewhat less than 30° F., while the waters of the Red Sea attain a maximum of more than 90° F., showing an extreme range between the warmest and the coldest parts of over 60° F. The greatest annual variation in any one locality is probably off the coast of Newfoundland, a region affected at different seasons by cold currents from the north and by warm currents from the tropics. With depth there is a rapid decrease in temperature (more rapid in regions near the equator) until a depth of about 400 fathoms is reached, when there is a very gradual lowering to the bottom, where the temperature remains practically uniform at from 32° F. to 35° F. and is independent of latitude. In inclosed seas shut off from communication with the deeper parts of the ocean by shallow barriers the temperature corresponds to that of the ocean only in the upper portions above the level of the barrier; below this depth the temperature remains constant to the bottom and is determined by the coldest surface waters in winter or by the influx of waters at the deepest inlet.

The average density of sea water is 1.026, there being a slight variation corresponding to the difference in salinity. Between the surface and great depths the density shows no material change, notwithstanding the enormous pressure exerted upon the lower layers. The color of pure ocean water, examined by transmitted white light, is pale blue, but becomes a deep blue, changing to sky blue, when it reflects the light of the clear sky, and to gray or almost black under heavy storm clouds. Along the shore, however, it may assume a brown or yellowish color from suspended mud, while in shallow portions or near the coast it is green. Minute vegetable and animal organisms sometimes lend a whitish or reddish color to the surface.

Movements of Ocean Waters. The surface waters of the ocean are in constant motion under the influence of waves, tides, currents, and drifts. Waves are vertical oscillations caused by the winds and have little movement of translation except in shallow water, when the upper portions rush forward with great force. Great waves caused by earthquakes move across the oceans. (See Earthquake.) Tides resemble waves in their motion, but they owe their origin to the attractive force of the sun and moon. (See Tides.) The horizontal movements of the surface waters are known as drifts and currents. A drift is a general movement under the influence of the wind, but slower and more changeable in direction than a current. (See Ocean Currents.) Inclosed seas also have circulatory movements, because their waters usually differ in density from the ocean.

Origin of the Oceans. The study of the geological history of the oceans is largely speculative. It is apparent, however, that the form of the oceanic basins has undergone changes corresponding to the variations in the continental outlines (see Continent), and it is also probable that the submarine portion of the lithosphere is involved in similar oscillations to those affecting the areas above sea level. According to Suess the Atlantic Ocean has resulted from the enlargement northward and southward of the mediterranean sea which during the Cenozoic era extended from Central America to southeastern Europe. The Pacific Ocean in recent geological times has increased its area by encroachment upon Australia, and the island chains of Polynesia, which are largely of coral formation, may also mark an area of submergence. The Indian Ocean probably occupies a depression in a former land surface (Gondwana land) that once extended from Central Africa to India. See Geology.

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OCEAN, IN LAW. See HIGH SEAS.

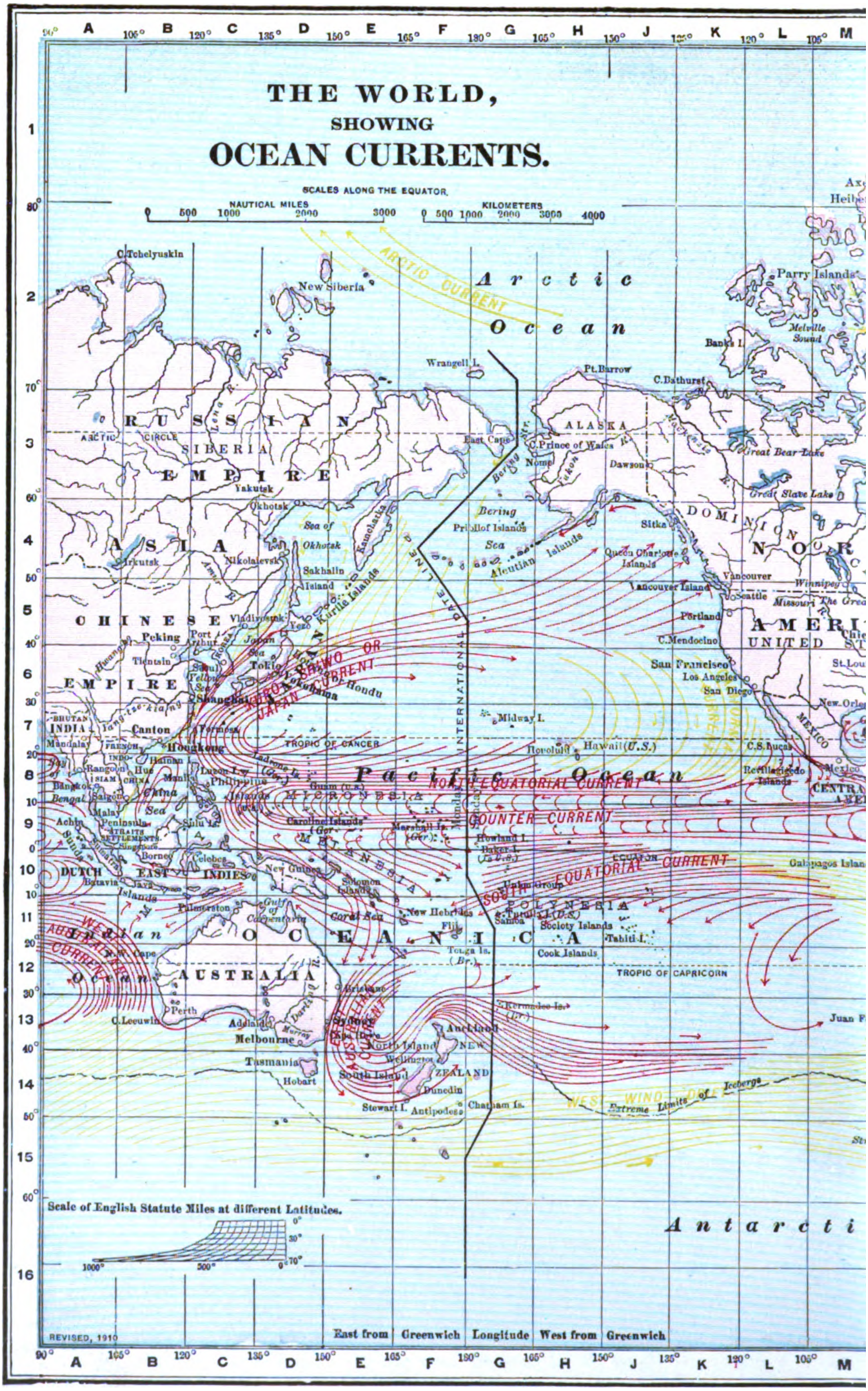
OCEAN CURRENTS. The consensus of scientific opinion at the present day is to the effect that there are two independent circulations involved in the movement of the waters of the sea, the first, the horizontal, having its source in the energy supplied by the wind; the second, the vertical, sustained by differences of temperature. The phenomena ordinarily described as ocean currents, consisting of the horizontal motion of the layer of water immediately at and near the surface, belong wholly to the former. The vertical circulation applies to the much more comprehensive creeping movement of the warm equatorial waters of the ocean towards the poles, a movement which is confined to the upper strata, and of the cold polar water towards the equator, confined to the depths of the ocean.

Surface Currents. As our knowledge of the movement of the surface waters of the ocean has increased it has become more and more apparent that these so-called currents are very unstable both in velocity and direction. The source—indeed the only source—from which information concerning them is to be derived is found in the log books of ships at sea, in which the difference between the observed and the computed position at noon of each day is entered as the current experienced by the ship during the preceding 24 hours. Upon assembling a number of such observations, extending over any period of time and covering a limited portion of the surface, a one-degree or five-degree square, e.g., it will be seen that these exhibit the utmost lack of agreement, the only indication of consonance being, indeed, that currents in a certain given direction appear with somewhat greater frequency than those in any other. These irregularities stand in close relation to the agency by which the currents themselves are produced, viz., the winds, the movements of the surface water being in response to the impulse communicated to it by the moving air. To explain, however, the fact so frequently noted, that the recorded set of the waters is in direct opposition to that which the prevailing wind would lead us to expect, some little consideration is necessary.

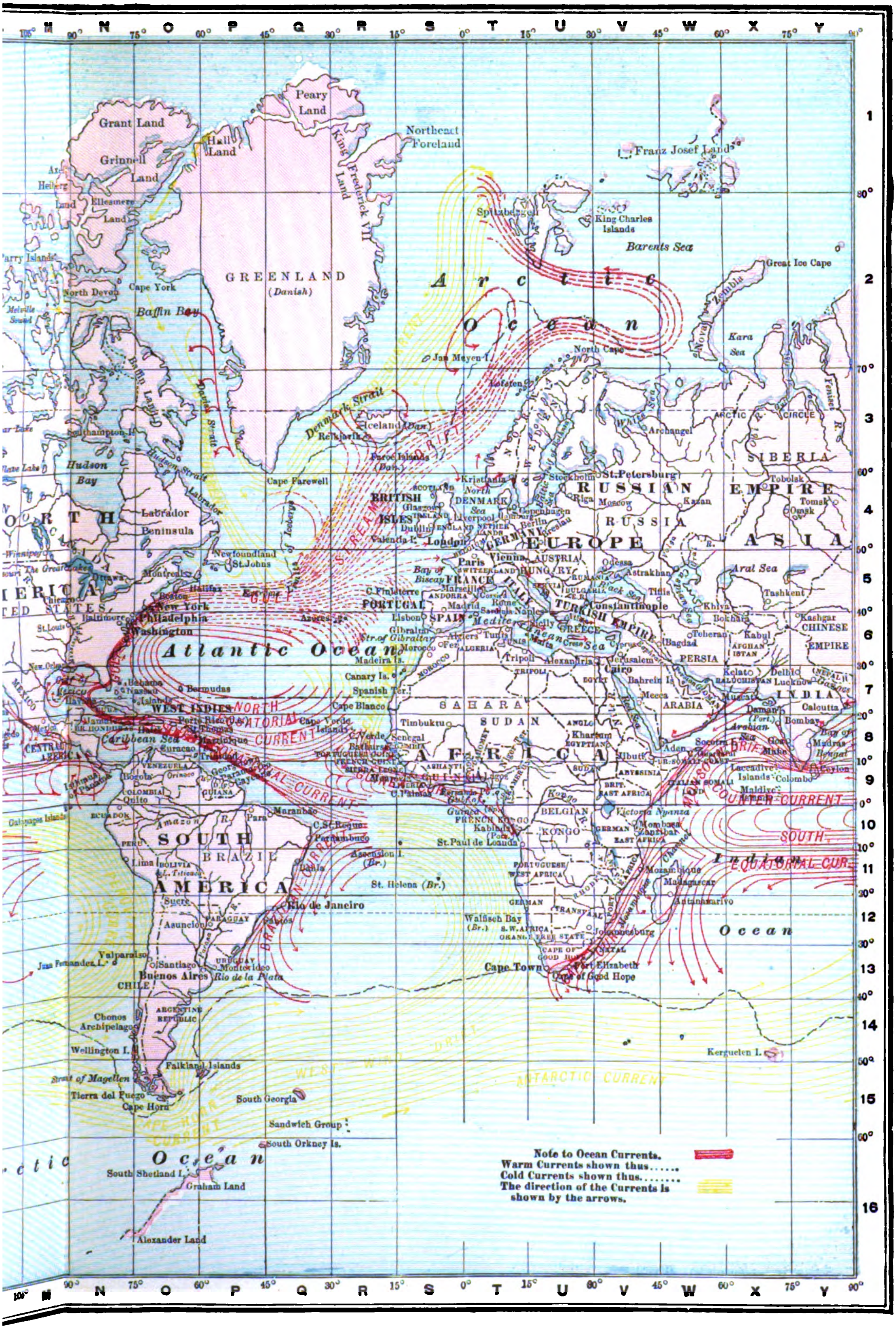
If through any cause a thin layer of liquid is set in motion in its own plane, the layer immediately below it and with which it is in contact does not remain stationary, but likewise receives an impulse. This second layer exercises a like influence over the third, the third over the fourth, and so on, the velocity ultimately attained by each successive layer being proportional to its distance from the bottom layer, which is supposed to be at rest. In the case of sea water the rapidity with which the surface velocity is propagated downward is exceedingly slight. It has been calculated, e.g., that a period of 239 years would elapse before a layer at a depth of 50 fathoms would attain a velocity equal to half that at the surface, the current at the latter being supposed to flow steadily all the time. In a similar manner a subsurface current, once established, exhibits a like reluctance to modify its direction. Immediately at the surface the set of the waters will thus be in close accordance with the direction of the wind; at some little distance below the surface, however, the variations will be by no means so closely followed, owing to the sluggishness with which the impulse is communicated downward; and at a moderate depth it may be assumed that the minor fluctuations are eliminated and that the mean direction and strength of the current become apparent, being those due to the resultant of the winds.

The system of winds covering each of the great oceans, the North Atlantic, the South Atlantic, the North Pacific, the South Pacific, and the Indian, is practically identical, consisting of a general westward motion of the air on the equatorial side of the tropical belts of high pressure and of a like easterly motion on the polar side—the former constituting the trade winds, northeast in the Northern Hemisphere, southeast in the Southern; the latter, the prevailing westerly winds of higher latitudes. In each of the oceans there is a general movement of the surface waters in response to these winds; in the tropical latitudes of either hemisphere towards the west—the north equatorial and the south equatorial drift—in extratropical latitudes towards the east. The north equatorial and the south equatorial drift carry the waters of the Atlantic towards the shores of America and the waters of the Pacific towards the shores of Asia and Australia, at a rate varying from 12 to 24 miles per day. The central line of either drift is well defined; along its marginal limits, however, north and south, compensation currents manifest themselves, due to the disturbed equilibrium, which, spreading out at first in sheaflike form, ultimately reverse their direction and flow to the eastward, those on the equatorial side of the main drifts uniting to form the eastward-flowing counterequatorial current, most apparent during July, August, and September, when it is reënforced by the southwest monsoon winds of the African and the Central American coasts; those on the polar side becoming merged in the general easterly drift of higher latitudes.

The immense mass of water carried by the equatorial drifts in the great oceans causes an accumulation upon the eastern continental shores and a consequent disturbance of equilibrium, which is in each case partially adjusted by a *stream* current, or current due to gravity alone, which in every case follows the shore line and is directed away from the equator. In the North Atlantic Ocean this current is known as the Gulf Stream, in the South Atlantic as the Brazilian Current, in the North Pacific as the Kuro Sivo, in the South Pacific as the Aus-



THE WORLD, SHOWING OCEAN CURRENTS.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Hall Land
Axel Heiberg Land
Ellesmere Land
King Frederick VII Land
Northeast Foreland
Franz Josef Land
Spitzbergen
King Charles Islands
Barents Sea
Great Ice Cape
Parry Islands
North Devon
Cape York
Melville Sound
GREENLAND (Danish)
Baffin Bay
Arctic Ocean
Nova Zembla
Kara Sea
Jan Meyen I.
North Cape
Lofoten
Denmark Strait
Iceland (Dan.)
Reikjavik
Davis Strait
Baffin Land
Southampton I.
Hudson Bay
Hudson Strait
Labrador
Labrador Peninsula
Cape Farewell
Faroe Islands (Dan.)
White Sea
Archangel
ARCTIC CIRCLE
SIBERIA
Tobolsk
Tomsk
Omsk
Yenisei R.
NORWAY
SWEDEN
Kristiania
Stockholm
St. Petersburg
RUSSIAN EMPIRE
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BRITISH ISLES
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IRELAND
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Dublin
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Valentia I.
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DENMARK
Copenhagen
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Newfoundland
St. Johns
Icebergs
GULF STREAM
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Montreal
Ottawa
Winnipeg
The Great Lakes
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Boston
New York
Philadelphia
Baltimore
Washington
St. Louis
New Orleans
Gulf of Mexico
MEXICO
Havana
Bahama Islands
Nassau
Bermudas
Azores
Atlantic Ocean
Paris
Vienna
Bay of Biscay
FRANCE
SWITZERLAND
AUSTRIA
HUNGARY
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Caspian Sea
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AFGHANISTAN
BALUCHISTAN
Kelat
Delhi
Lucknow
NEPAL
INDIA
Ganges
Muscat
ARABIA
Mecca
Bahrein I.
Persian Gulf
Red Sea
Calcutta
Bombay
Daman (Port.)
Arabian Sea
Goa
Bay of Bengal
Madras
Laccadive Islands
Colombo
Ceylon
Maldive
Socotra
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WEST INDIES
NORTH EQUATORIAL CURRENT
Porto Rico
Martinique
Caribbean Sea
Curacao
Trinidad
BR. HONDURAS
CENTRAL AMERICA
Isthmus of Panama
Cape Verde Islands
C. Verde
Senegal
Bathurst
Timbuktu
SAHARA
SUDAN
ANGLO-EGYPTIAN SUDAN
Khartum
Jibuti
ABYSSINIA
BR. SOMALI LAND
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AFRICA
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LIBERIA
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Gulf of Guinea
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Lagos
KAMERUN
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Georgetown
Paramaribo
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Bogota
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SOUTH EQUATORIAL CURRENT
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Amazon R.
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FRENCH KONGO
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BRIT. EAST AFRICA
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Cape Town
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SOUTH EQUATORIAL CURRENT
Indian Ocean
PERUVIAN CURRENT
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Asuncion
URUGUAY
Montevideo
Rio de Janeiro
Rio de la Plata
Buenos Aires
Valparaiso
Santiago
Juan Fernandez I.
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ARGENTINE REPUBLIC
Chonos Archipelago
Wellington I.
Falkland Islands
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Tierra del Fuego
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CAPE HORN CURRENT
South Georgia
Sandwich Group
South Orkney Is.
WEST WIND DRIFT
ANTARCTIC CURRENT
Kerguelen I.
Antarctic Ocean
South Shetland I.
Graham Land
Alexander Land
Note to Ocean Currents.
Warm Currents shown thus.....
Cold Currents shown thus.......
The direction of the Currents is shown by the arrows.

tralian Current, in the Indian Ocean as the Mozambique Current. These are more constant in direction and force than the ordinary drift currents, but likewise are subject to stoppage or even to reversal. Upon attaining middle latitudes the combined effect of the deflective force of the earth's diurnal rotation and of the prevailing westerly winds serves to turn them offshore, and their identity is henceforth lost in the general easterly drift of the temperate zone. The easterly drift of extratropical latitudes exhibits none of the persistency of the westerly drift of the tropical, the currents reported being apparently quite as variable as the winds themselves.

In the case of the North Atlantic Ocean the easterly drift divides to the northwestward of the Azores, one portion carrying to the southward along the peninsular and African shores and finally reuniting with the north equatorial current, the whole system forming a vast gentle eddy in close agreement with the prevailing winds; the remaining portion carries eastward and northward towards the shores of Great Britain, Scandinavia, and Iceland.

Vertical Circulation. The theory of a vertical oceanic circulation rests almost entirely upon the study of the thermal conditions existing in the Atlantic. The main facts in support of the theory may be summarized as follows: (1) the bottom water of every ocean in free communication with the pole has a temperature but little different from that in polar latitudes; (2) this is true even in the equatorial regions, where the entire mass of the ocean, in case an influx of cold water did not exist, would by virtue of the insolation attain in the course of time a temperature not lower than 75° F.; (3) the bottom temperatures in the case of those oceans to which the cold polar water has free access are somewhat lower than the bottom temperatures where this communication is restricted; (4) the thickness of this bottom stratum of cold water (600 fathoms) is too great to admit of the explanation that it is the return flow of the warm water carried poleward by the drift surface currents; (5) there is a continual ascent of glacial water under the line, shown by the moderation of the surface temperatures along the equator and also by the fact that polar temperatures are here attained at less depth than in somewhat higher latitudes; (6) on the basis of this hypothesis the presence of the cold band along the eastern coast of North America can be explained as the ascent towards the surface of the polar water, diverted from its original equatorial course by the effect of the earth's rotation and forced up the Atlantic slope.

Influence upon Climate. The circulation of oceanic waters by means of currents has a marked influence upon the distribution of temperatures. The currents from the equatorial regions may impart their warmth to lands situated in high latitudes, and conversely the chill of the polar currents may affect the shores of continents quite remote from their source. In the middle latitudes the western shores of the continents generally have a milder climate than the eastern shores, owing to the westerly winds which transmit the warmth of the currents to the lands lying to the leeward. Thus, the western coast of Europe which lies in the path of the North Atlantic drift has a relatively warmer climate than the eastern coast of North America. The Arctic current which flows by Labrador and Newfoundland gives a rigorous climate to those countries and the neighboring lands. The winds which accompany warm currents are laden with moisture, and this is usually precipitated as they reach the lands. Whenever such winds encounter cool currents they give rise to fogs, as instanced by the dense fogs that prevail much of the time off the coast of Newfoundland where the warm and cold currents meet.

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OCEAN DEPOSITS. See Deep-Sea Exploration; Ocean.

OCEAN GROVE. A summer resort in Monmouth Co., N. J., 54 miles by rail south of New York City, on the Pennsylvania and the Central of New Jersey railroads (Map: New Jersey, E 3). Situated directly on the Atlantic Ocean, south of Asbury Park, from which it is separated by Wesley Lake, Ocean Grove is on the splendid beach for which watering places of the New Jersey coast are noted. The town, inclosed mostly by natural boundaries, is controlled by a camp meeting association of the Methodist Episcopal church, founded in 1869, whose regulations enforce a strict respect for the Sabbath and prohibit theatrical performances and the sale of intoxicating liquors. There are three large public buildings: the Auditorium, post office, and school. In the Auditorium, which seats 10,000 persons, religious meetings are frequently held. The Neptune Township high school was erected at a cost of $72,000. The water works and electric-light plant are owned and operated by the association. The number of summer visitors is estimated at over 25,000, though the permanent population is only about 2500.

OCEANIA, ō'shē-ăn'ĭ-ȧ, **OCEANA,** ō'shē-ā'nȧ, or **OCEANICA,** ō'shē-ăn'ĭ-kȧ. A designation used in systematic geography to embrace so much of the land surface of the earth as remains after apportioning the continents of Eurasia, Africa, and the Americas. When first brought into use, the term covered Australia, the Indian Archipelago, and the Pacific islands. When Australasia was set aside as a continent, Oceania was restricted to the islands of the Pacific and the Malay Archipelago. Geotectonic considerations have led to the subdivision of this remaining insular province into Indonesia, Melanesia, and Polynesia (qq.v.). The zoögeography of the regions to a considerable degree, the ethnology to a marked degree, conform with this division into three provinces.

OCEAN'IC DEPOSITS. See Deep-Sea Exploration; Ocean; Ooze; etc.

OCEANIC FAUNA. See Deep-Sea Exploration; Ooze; Pelagic Animals.

OCEANIDS, ō-sē'ȧ-nĭdz (Gk. *'Ωκεανίδες, Ōkeanides*). The 3000 daughters of Oceanus (q.v.) and Tethys, nymphs of the sea. See Nymph.

OCEAN LANES. See SAFETY AT SEA.

OCEAN LIFE. See CETACEA; DEEP-SEA EXPLORATION; DISTRIBUTION OF ANIMALS; OOZE; PELAGIC ANIMALS; PROTOZOA.

O'CEANOG'RAPHY (from *ὠκεανός, ōkeanos*, ocean + *-γραφία, -graphia*, description, from *γράφειν, graphein*, to write). The name given to the branch of geography which deals with the phenomena of the collected waters of the earth—the oceans and seas. The name has only recently come into general use, as a result of the great expansion in our knowledge concerning the ocean during the last 30 years. See DEEP-SEA EXPLORATION; DIVING; GEOGRAPHY; OCEAN; PHYSIOGRAPHY.

OCEAN PATROL. See SAFETY AT SEA.

OCE'ANUS (Lat., from Gk. *'Ωκεανός, Ōkeanos*). In classical mythology, the eldest of the Titans, son of Uranus and Gæa, and father, by his sister Tethys, of the 3000 Oceanids, or ocean nymphs. In Homer Oceanus is the ever-flowing stream which surrounds the circular plain of the earth, and the sea itself. From him come all streams and fountains, and even the sea. Hesiod (*Theogony*, 337–370) first gives the accepted genealogy. Oceanus does not appear in any of the myths as a governing personality like Poseidon, but only as a spectator. In the *Prometheus Bound* Æschylus introduces him as advising the captive Prometheus to submit to Zeus. Representations of Oceanus in art are very rare before the Hellenistic period; then he is depicted, like the river gods, as a bearded man, often with horns, and is characterized by the steering oar or by the sea animals surrounding him.

OCELLI, ō-sĕl'lī, or LENS CELLS. These cells have been regarded by some observers as the most specialized organs of light perception possessed by plants; in fact, they have been described as primitive eyes. They occur on foliage leaves that are arranged at right angles to incident light, and are in the form of convex lens-shaped epidermal cells. These cells may cover the entire surface, as in a species of *Tradescantia*, or may be scattered at intervals over it, as in a *Fittonia*, but in every case the convex form is such that it brings the rays of light to a focus within the leaf. Sometimes the focus is so good that photographs of small objects have been taken by using these leaf lenses. This concentration of light rays is supposed to afford a stimulus which leads to the adjustment of the leaf to the direction of the rays, but as leaves without such lens cells often make an equally good adjustment, conservative scientists regard the ocelli as of little or no importance except as curiosities.

OCEL'LUS LUCA'NUS (Lat., from Gk. *῎Οκελλος, Okellos*). A Lucanian Greek and member of the Pythagorean school; perhaps of the fifth century B.C. Stobæus, i, 13, has preserved a fragment of his work, in Dorian dialect, and we hear of various philosophical writings by him which have now been lost. The extant work *On the Nature of the Universe* (Περὶ τῆς τοῦ Παντὸς Φύσεως), in the Ionic dialect, which bears Ocellus' name, is certainly a work of the later Peripatetic school and cannot be earlier than the first century B.C.; it may be still later, as it shows remarkable coincidences with the similar work of Nicolaus Damascenus (q.v.). In four chapters the book handles the themes of the eternity of the cosmos, the distinction between the permanent and the transitory, the divisions of the universe, the heavens, earth, and the human race, the nature of time, etc.; throughout the author's statements are based on the writings of Aristotle. The work closes with a consideration of the relation of the propagation of humankind to certain cosmic and moral questions. It is best edited in vol. i of Mullach's *Fragmenta Philosophorum Græcorum* (Paris, 1860; Eng. trans. by Thomas Taylor, London, 1831).

OCELOT, ō'sē-lŏt (Mex. *ocelote*). A beautiful wild cat (*Felis pardalis*) of tropical America, from Louisiana to Brazil. It inhabits forests, is an agile tree climber, and preys mainly on birds. It is from 2½ to 3 feet long, exclusive of the tail, which is from 11 to 15 inches and nearly of uniform thickness. The ears are thin, short, and pointed. The muzzle is rather elongated. The colors vary considerably, but the ground tint is rich reddish gray or tawny, blending finely with the dark brown on the margins of the elongated spots, of which there are chains on the sides; the head, neck, and legs being also variously spotted or barred with dark brown or black. This animal is often called a panther cat.

ÖCHELHÄUSER, ĕĸ'el-hoi'zẽr, WILHELM VON (1820–1902). A German economist and Shakespearean scholar. He was born at Siegen, was educated for a commercial career, and held several posts in the Imperial Ministry of Commerce. Oechelhäuser was ennobled in 1883, was appointed to the Colonial Council in 1893, and in the same year received an honorary doctor's degree from Erlangen. In the field of economics he wrote *Die Tarifreform von 1879* (1880), *Die Arbeiterfrage* (1886), and *Soziale Tagesfragen* (1889). He did much to further the study of Shakespeare in Germany as founder and president of the *Shakespearegesellschaft*, as editor of a stage edition of Shakespeare (1878; 14th ed., 1894), and as author of *Einführungen in Shakespeares Bühnendramen* (3d ed., 1895) and *Shakespeareana* (1894).

OCHER. See OCHRE.

OCHINO, ō-kē'nō, BERNARDINO (1487–1564). An Italian preacher and theologian, born at Siena. He entered the Franciscan Order and then the still more ascetic order of the Capuchins, of which he was made vicar-general in 1538 and reëlected in 1541. Remarked for his preaching by Charles V, he rose to be confessor to Pope Paul III. The Reformation had begun to make converts in Italy, and Ochino's friends, among whom were Juan de Valdés and Vittoria Colonna, were suspected of leanings towards heresy. His sermons delivered at Venice (1539) showed the influence of the Reformation, but no active step was taken until 1542, when he was commanded to appear before the newly founded Inquisition in Rome and answer certain charges. Fearing the consequences, Ochino made his way to Geneva. Here he published some more sermons of a Calvinistic nature, under the title *Prediche* (1542–44), translated into German (1545), French (1546, 1561), and English (1548). But with Calvin himself he could not agree. He left Geneva and wandered into Germany, spending some time at Augsburg (1545–47) as pastor of the Italian Protestant church there. He then went to London (1547–53), where he became a prebendary of Canterbury and was pensioned by Edward VI. His *Trajedy or Dialogue of the Unjust Usurped Primacy of the Bishop of Rome* (1549), written in London, is supposed to have influenced Milton's *Paradise Lost*. In 1555 he went to Zurich, but his congregation was scandalized by his doctrines concerning polygamy and the Trinity, and he moved on to Cracow. Here, again, his sermons were criticized, and he died not long afterward at Schladou in Moravia. Many of Ochino's works, mostly written in Latin, have been lost. Consult Thomas McCrie, *Progress and Suppression of the Reformation in Italy* (Philadelphia, 1856), and B. O. Benrath, *B. Ochino von Siena* (Leipzig, 1875; 2d ed., Brunswick, 1892; Eng. trans., New York, 1877).

OCHLOCK′NEE, or **OCKLOCKNEE** (from a Creek Indian word said to mean "yellow water"). A river of the coastal plain of southeast United States, about 150 miles long, rising in Worth Co., Ga., flowing southwest, then southeast, and entering the Gulf of Mexico at Apalachee Bay (Map: Georgia, B 5). It is scarcely navigable, but considerable timber is rafted down it in Florida, the country adjacent to it being mostly long-leaf-pine forest. Along its west bank are extensive deposits of clay, used for brickmaking.

OCHOA, ō-chō′ȧ, EUGENIO DE (1815–72). A Spanish poet, critic, and scholar, born at Lezo in the Province of Guipúzcoa. He studied in Madrid and then went to Paris (1829), where he worked at the Ecole des Arts et Métiers. On his return to Madrid he contributed to the *Gaceta de Madrid*, directed by Alberto Lista. After the defeat of his political friends he went back to Paris and, with Baudry, edited the *Colección de los mejores autores españoles* and prepared new editions of Spanish classics. His volume of poems, *Ecos del alma*, appeared in 1841, and in 1844 he made a *Catálogo razonado* of all Spanish manuscripts in the Paris libraries. In the same year he returned to Madrid and was appointed underlibrarian of the National Library, director general of public instruction, and Councilor of State. His services were later rewarded by decorations. In 1847 he became a member of the Spanish Academy. His works include: *Incertidumbre y amor* (1836); *Paris, Londres y Madrid* (1861); *Miscelánea de literatura, viajes y novelas* (1867); and a creditable prose translation of the complete works of Vergil.

OCHRE, ō′kẽr (Fr. *ocre*, from Lat. *ochra*, from Gk. *ὤχρα*, yellow ochre, from *ὠχρός*, *ōchros*, pale). A mineral paint consisting of clay colored with some oxide of iron, rarely of manganese, in various proportions, giving to the clay a lighter or deeper color. Good grades of ochre should contain 20 per cent or more of iron oxide. Ferruginous shale is often ground and marketed as ochre. Ochres are common in many geological formations, especially the younger ones, in which the materials are not consolidated. For use the material is dried, ground, and mixed with oil. The commercial value of the material depends on its shade of color, the regularity of distribution of the iron coloration, and the quantity of oil which is required to mix it up. Calcination is sometimes resorted to in order to produce the desired tint; the operation adds much to the depth of color, by increasing the degree of oxidation of the contained iron. The common color of ochre is yellow. Umber and sienna differ from ochre in containing manganese in addition to the iron. Raw umber has a brown color, while burnt umber is of a red tinge. Raw sienna is brownish yellow, but when burned it yields a rich russet-brown pigment. The finer grades of ochres are used by painters, the coarser by carpenters for marking out their work, etc. Common ochre is found in many parts of the United States. In 1913 ochre was produced in Alabama, California, Georgia, Iowa, Pennsylvania, Vermont, and Virginia. Georgia supplied 65 per cent of the domestic production. Umber and sienna are produced by New York, Pennsylvania, and Missouri, but much is also imported. France leads the world in the production of ochre, with Germany second and the United States third. The United States production in 1913 was: ochre, 17,578 short tons, value $173,944; umber and sienna, 776 short tons, value $20,790. The imports of ochre in the same year amounted to 8349 short tons, value $143,720; of dry umber, 2268 short tons; of dry sienna, 1184 short tons, the combined value of the last two being $66,269. Consult: *Mineral Resources of the United States*, issued by United States Geological Survey (Washington, annually); Hayes and Eckel, "Ochre Deposits of Cartersville District, Georgia," in *United States Geological Survey, Bulletin, No. 213* (ib., 1902); T. L. Watson, "Ochre Deposits of Georgia," in *Georgia Geological Survey, Bulletin, No. 13* (Atlanta, 1906); Willimott, "Mineral Pigments of Canada," in *Canada Geological Survey, Bulletin, No. 913* (Ottawa, 1906); Miller, "Mineral Pigments of Pennsylvania," in *Pennsylvania Topographic and Geologic Survey, Report, No. 4* (Harrisburg, 1911). See PAINT, MINERAL.

OCHRO. A vegetable. See HIBISCUS.

OCHS, ŏks, ADOLPH S. (1858–). An American newspaper publisher, brother of George W. Ochs. He was born in Cincinnati and attended the public schools of Knoxville, Tenn., where he was also a carrier newsboy and printer's apprentice in 1869–73. In 1878 he undertook the publication of the Chattanooga (Tenn.) *Times*. The New York *Times*, of which he became publisher and principal owner in 1896, under his control developed from a bankrupt condition into one of the most prosperous and influential papers in the United States. For a time also Adolph Ochs was proprietor of the Philadelphia *Public Ledger*, sold in 1913 to Cyrus H. K. Curtis. He became a director of the Associated Press.

OCHS, GEORGE WASHINGTON (1861–). An American newspaper editor, brother of Adolph S. Ochs. He was born in Cincinnati and studied at the University of Tennessee in 1873–79. In Chattanooga he held various offices of public trust, being mayor (1894–95, 1896–97), president of the board of education (1897–1900), and president of the Chamber of Commerce (1899–1900). He published an edition of the New York *Times* at the Paris Exposition of 1900, served as general manager of the Philadelphia *Times* in 1901–02, and thenceforth was editor in chief of the *Public Ledger* (Philadelphia).

OCHS, SIEGFRIED (1858–). A German composer and conductor, born at Frankfort-on-the-Main. He was educated at the Königliche Hochschule für Musik at Berlin and also studied with Kiel, Urban, and Von Bülow. In 1882 he founded and thereafter conducted the choral union, Philharmonischer Chor, which developed into the largest singing society in Berlin. His works comprise three operettas, male choruses, vocal canons, duets, and songs.

OCHSNER, ŏks′nẽr, Albert John (1858–). An American surgeon, born at Baraboo, Wis. He received his M.D. from Rush Medical College, Chicago, in 1886 and, after postgraduate work at Berlin and Vienna, in 1889 he established himself in Chicago. There he became professor of clinical surgery at the College of Physicians and Surgeons in 1900, having been for four years chief surgeon at Augustana and St. Mary's hospitals. In 1908 he was made first lieutenant in the United States Army Medical Reserve Corps, and in 1909 the University of Wisconsin gave him the degree of LL.D. Among his writings are: *Handbook on Appendicitis* (1902; 2d ed., 1906); *Clinical Surgery for the Instruction of Practitioners and Students* (1902; 2d ed., 1905); *Organization . . . of Hospitals* (1904); *A Review of the Histories of One Thousand Consecutive Cases of Appendicitis* (1904); *The Field of Usefulness of the Clinical Congress of Surgeons of North America* (1913); *A New Manual of Surgery*, with N. M. Percy (4th ed.; revised and enlarged, 1915).

OCHTERLONY, ŏk-tẽr-lō′nĭ, Sir David (1758–1825). A British general and administrator in India. He was born in Boston, Mass., of Scottish ancestry, and in 1777 went to India as cadet. He defended Delhi successfully in 1804 against Holkar (q.v.), and next checked the Sikhs, being promoted colonel in 1812 and major general in 1814. In the latter year, after the rising of the Nepalese, Ochterlony was put in command of the forces west of the Gurkha frontier, and was successful in storming the forts in the hills when the three other divisions were defeated or inactive. He closed the campaign at Malaun, where he received the surrender of Amar Singh. Again, in 1815, when the Gurkha government failed to ratify the peace, Ochterlony with great energy and brilliancy reduced all opposition. After the Marathas were conquered in 1818 Ochterlony was a leader in the work of reconstruction. In 1822 he was appointed British Resident with chief authority in Central India.

OCHTMAN, ŏkt′măn, Leonard (1854–). An American landscape painter, born at Zonnemaire, Zeeland, Holland. His family removed to America in 1866 and settled at Albany, N. Y. For a time he worked as a draftsman in an engraving office, devoting his leisure to painting, in which he had no regular instruction except one winter's course at the Art Students' League in New York City. Many of his best subjects are country scenes on or about the Mianus River (Connecticut). He chose tranquil, quiet stretches of water shaded by trees and bathed in moonlight, as in his "Night on the Mianus River," which won a medal at the World's Fair in 1893; "Autumn Moonlight"; "Moonlight Night in Spring." His "Winter Light" (Metropolitan Museum, New York), "November Morning" (Corcoran Gallery, Washington), "Frosty Acres" (St. Louis Museum), "Morning Haze" (National Gallery, Washington), and "A Gray Morning" (Brooklyn Institute) are day scenes of equal charm and truth. His work is all distinguished by broad painting, simplicity of expression, serenity of effect, and largeness of treatment. He received the Innes gold medal in 1903 and two gold medals at St. Louis (1904). At the Panama-Pacific Exposition (1915) he received a gold medal.

OCKEGHEM, or **OCKENHEIM.** See Okeghem.

OCKERSON, ŏk′ẽr-son, John Augustus (1848–). An American civil engineer, born at Skåne, Sweden. He was brought to the United States at the age of three, was in the 132d Illinois Infantry and 1st Minnesota Heavy Artillery in the Civil War, and graduated S.B. and C.E. from the University of Illinois in 1873. He assisted in the survey of the Great Lakes in 1871–79, was United States assistant engineer on the Eads jetties in 1876, and from 1879 to 1887 was busied in the government survey of the Mississippi River. In 1888–89 he served as manager and engineer of a gold and silver mine in Colorado. He was chief assistant engineer from 1889 to 1898 and thereafter a member of the Mississippi River Commission. In 1912 he was president of the American Society of Civil Engineers.

OCKHAM, William. See Occam, William of.

OCKLAWAHA. See Oklawaha.

OCKLEY, ŏk′lĭ, Simon (1678–1720). An English Orientalist. He was born at Exeter, entered Queens' College, Cambridge, in 1693 and in 1705 became vicar of Swavesey. From Arabic manuscripts in the Bodleian Library, Oxford, he prepared *The History of the Saracens* (1708–18), a work containing much serviceable information. In 1711 he was made professor of Arabic at Cambridge. He also translated Leon Modena's Italian *History of the Present Jews throughout the World* (1707).

OCKLOCKNEE. See Ochlocknee.

OCMUL′GEE. A river of Georgia, formed by several head streams, near Atlanta, in the northern part of the State (Map: Georgia, C 4). It flows south-southwest, finally turning eastward, and joins the Oconee in Montgomery County to form the Altamaha. It is about 340 miles long, and navigable for small steamers to Macon, about halfway to its source. Its upper course is broken by rapids, and furnishes water power, while its lower course is through pine barrens.

O'CON′NELL, Daniel (1775–1847). An Irish national leader. He was the eldest son of an ancient but unimportant family of County Kerry, Ireland, and was born on Aug. 6, 1775. O'Connell received his first education from a hedge schoolmaster, but afterward, under the patronage of his uncle, Maurice O'Connell, attended Father Herrington's school at Cove and the Catholic colleges of Saint-Omer and Douai, France. His scholarship had just begun to win for him promises of a brilliant future when he was driven home prematurely by the outbreak of the French Revolution, and in 1794 he entered as a law student at Lincoln's Inn. In 1798 he was called to the Irish bar. By degrees, the Roman Catholic party having begun to rally from the prostration into which it had been thrown by the rebellion of 1798, O'Connell was drawn into public life, and his unquestioned ability soon made him a leader. He was an active member of all the successive associations which, under the various names of Catholic Board, Catholic Committee, Catholic Association, etc., were organized for the purpose of procuring the repeal of the civil disabilities of the Catholic body. Of the Catholic Association he was himself the originator, and by means of this association he created so formidable an agitation throughout Ireland that it gradually became apparent that the desired measures of relief would no longer be safely withheld. The crisis was precipitated by the bold expedient adopted by O'Connell, of causing himself to be elected member of Parliament for Clare in 1828, notwithstanding his incapacity to serve in Parliament in consequence of his being obliged to refuse the prescribed oaths of abjuration and supremacy, which then formed the ground of the exclusion of Roman Catholics from the Legislature. This step, although it failed to procure for O'Connell admission to Parliament at the time, led to discussions within the House and to agitations outside so formidable that in the beginning of the year 1829 the Duke of Wellington and Sir Robert Peel found it expedient to give way, and, deserting their party in the face of strenuous Tory and royal resistance, they introduced and carried through, in the spring of that year, the well-known measure of Catholic emancipation. O'Connell was at once reëlected and took his seat for Clare, and from that date until his death continued to sit in Parliament. During all these years he received, by means of an organized annual subsidy, a large yearly income from the voluntary contributions of the people, by whom he was idolized as their liberator, and who joined with him in all the successive agitations against the Act of Union, against the Protestant church establishment, and in favor of reform, in which he engaged. In the progress of more than one of these political agitations his associations were opposed by the government. The agitation for the repeal of the Union, begun in 1841, was carried on by monster meetings throughout Ireland, at which O'Connell himself was the chief speaker. This agitation assumed proportions so formidable that O'Connell, in common with several others, was indicted for a seditious conspiracy in 1843 and was convicted and sentenced to a year's imprisonment, with a fine of £2000. This judgment was reversed by the House of Lords, and O'Connell, on his discharge, resumed his career. But his health had suffered from confinement and still more from dissensions and opposition in the councils of his party; and since, on the return of the Whigs to power in 1846, he consented to support their government, the malcontents of the repeal association openly separated from him, and a bitter feud between young and old Ireland ensued. In this quarrel O'Connell steadfastly maintained his favorite precept of moral force, and was supported by the great body of the Catholic bishops and clergy; but his health gave way in the struggle. He was ordered to try a milder climate, and on his journey to Rome in the spring of 1847 he was suddenly seized with paralysis and died at Genoa on May 15 of that year. As a public speaker, and especially as a master of popular eloquence, he was almost unsurpassed in his day. His ability as a lawyer was of a high order. He published a single volume, *A Memoir of Ireland, Native and Saxon*, and a few pamphlets, the most important of which, as illustrating his personal history and character, is *A Letter to the Earl of Shrewsbury*.

Bibliography. O'Connell, *Life and Times of Daniel O'Connell* (Dublin, 1846); id., *Recollections and Experiences during a Parliamentary Career from 1833 to 1848* (London, 1849); W. J. Fitzpatrick, *Correspondence of Daniel O'Connell* (ib., 1888); Robert Dunlop, *Daniel O'Connell and the Revival of National Life in Ireland* (New York, 1900); W. E. H. Lecky, *Leaders of Public Opinion in Ireland* (ib., 1903); Michael MacDonagh, *Life of Daniel O'Connell* (St. Louis, 1905).

O'CONNELL, WILLIAM HENRY, CARDINAL (1859–). An American Roman Catholic prelate, born at Lowell, Mass. He entered the American College at Rome, Italy, in 1881, was ordained a priest in 1884, and was appointed rector of the American College in 1895. He was named Bishop of Portland, Me., in 1901, was appointed assistant at the pontifical throne in 1905, and in the latter year was sent as special papal envoy to the Emperor of Japan, by whom he was decorated. He became Archbishop of Constance in 1906, was transferred to the see of Boston in 1907, and in 1911 was elevated to the cardinalate. A volume of his *Sermons and Addresses* was published in 1911. Cardinal O'Connell gained a reputation as one of the most influential Catholics in the United States.

O'CONNOR, ANDREW (1874–). An American sculptor. He was born in Worcester, Mass., and studied under his father and Daniel C. French. He is known for his decorative statues and reliefs and for numerous military memorial monuments. Among the most important are: the reliefs of the central porch and bronze doors of St. Bartholomew's Church, New York; bas-relief, library of J. P. Morgan, New York; eleven marble statues for the Court House, Newark, N. J.; the monuments to General Liscum, Arlington, Va., General Thomas, Tarrytown, N. Y., and Governor John A. Johnson, St. Paul, Minn.; bronze statues of General Lawton, Indianapolis, General Lew Wallace, Crawfordsville, Ind., and a marble statue of the latter in the Capitol, Washington. His contribution to the sculptural decorations of the St. Louis Exposition was the huge bronze figure "Inspiration," surmounting the permanent Art Building. The Luxembourg possesses the model of his statue of Commodore Barry and a marble portrait bust of Edward Tuck. Most of his work displays decided talent in composition and spontaneity of execution. In 1906 O'Connor, who made Paris his permanent home, was awarded the second medal at the Salon, an honor only once before bestowed on an American sculptor.

O'CON'NOR, ARTHUR (1763–1852). An Irish revolutionist, born at Mitchelstown, County Cork. He graduated at Trinity College, Dublin, in 1782 and in 1788 was called to the bar. In 1796 he joined the United Irishmen, and was arrested and imprisoned for six months. On regaining his liberty he became editor of the *Press*, the organ of his society. During a visit to England he was arrested and tried for high treason, and though acquitted was kept in prison on other charges until June, 1803. He then went to France, where he entered into relations with Napoleon and was appointed in 1804 a general of division, but never saw active service. O'Connor married the daughter of Condorcet (q.v.) and became a French subject in 1818. Feargus O'Connor was his nephew. His published works include: *A Speech on the Catholic Question* (1795); *State of Ireland* (1798); *Actual State of Great Britain* (1804); *Monopoly, the Cause of All Evil* (1848).

O'CONNOR, FEARGUS EDWARD (1794–1855). An Irish politician and Chartist leader, nephew of Arthur O'Connor. He was born in County Meath, was educated at Trinity College, Dublin, and was called to the bar. He took part in the agitation for the Reform Bill (see GREY, CHARLES, second EARL GREY), in 1832 sat in Parliament for Cork, but when reëlected in 1835 was unseated through the lack of property qualifications. He thereupon engaged in the Radical agitation in England, spoke frequently, and in 1837 founded at Leeds a weekly organ, the *Northern Star*. In 1838 he was foremost in the consolidation of the Chartists, and to that party his somewhat incoherent though moving eloquence lent valuable support. In 1846 he organized the National Land Company, for the purpose of buying up agricultural estates and dividing them into small holdings. Several estates were bought, but the scheme came to nothing. The next year he reëntered Parliament for Nottingham, and in 1848 presented to the Lower House his monster petition. (See CHARTISM.) O'Connor became insane in 1852.

O'CONNOR, JOSEPH (1841–1908). An American journalist, born at Tribes Hill, N. Y. He graduated from the University of Rochester in 1863 and was admitted to the bar in 1869. He served as reporter and editor of the Rochester *Democrat and Chronicle* (1870–73), as editor of the Indianapolis *Sentinel* (1873–75), as editorial writer of the New York *World* (1875–78), as editor of the Buffalo *Courier* (1879–85) and of the Rochester *Post-Express* (1886–96). For the last-named paper he conducted "The Rochesterian" after 1898. His *Poems* were published in 1895 and *The Rochesterian* (2 vols.) in 1911.

O'CONNOR, RODERIC, or RORY (1116–98). King of Ireland. He was the son of Turlough O'Connor, King of Connaught, whom he succeeded in 1156. After a protracted contest with the O'Briens and others he took the title of King of Ireland in 1166, though he had no hereditary claim. He drove Macmurrough (q.v.), King of Leinster, out of his kingdom, but afterward reseated him on the throne. He worsted Strongbow and the English in a number of battles, but in 1175 entered into a convention with them, by which Henry II was recognized as overlord, while O'Connor was to retain the crown of Connaught and continue to be the head of the Irish chiefs. Rory kept the crown till 1186, when he was deposed by a revolt of one of his sons. In 1189 he was again King for a short time, after which he entered a monastery, where he passed the rest of his life. Consult G. H. Orpen, *Ireland under the Normans* (2 vols., Oxford, 1911).

O'CONNOR, THOMAS POWER (1848–). An Irish journalist and national leader. He was born at Athlone, Roscommon, Ireland, Oct. 5, 1848, and was educated at the College of the Immaculate Conception, Athlone, and at Queen's College, Galway. After being connected for three years with the Dublin press he was employed on several London journals. In 1880 he was elected member of Parliament for Galway, and soon became one of the most active and prominent members of the party led by Parnell. In 1881 he made a tour through the United States, attended the Irish-American convention, and lectured on the Irish cause to large gatherings, raising large sums; and in 1906 he again came to America to further Home Rule. In 1883 O'Connor was elected president of the Irish National League of Great Britain. In 1885 and at subsequent elections he was returned to Parliament from Liverpool. From 1888 to 1890 he edited the *Star*, of which he was the founder; and he also founded and edited the *Sunday Sun*, the *Sun*, *M. A. P.*, and *T. P's Weekly*. His published works include: *Lord Beaconsfield: A Biography* (6th ed., 1887); *Gladstone's House of Commons* (1885); *The Parnell Movement* (1886); *Gladstone-Parnell and the Great Irish Struggle* (1886), with R. M. McWade; *Sketches in the House* (1893); *Napoleon* (1896); *The Phantom Millions: The Story of the Great French Fraud* (1902); *Sir Henry Campbell-Bannerman* (2d ed., 1908).

OCON'OMOWOC. A city in Waukesha Co., Wis., 33 miles west by north of Milwaukee, on the Chicago, Milwaukee, and St. Paul Railroad (Map: Wisconsin, E 5). It is a noted summer resort, situated on Lakes La Belle and Fowler, and in the heart of a beautiful lake region, popular for its fishing. It has a sanatorium and a public library. Farming, dairying, and stock raising are the leading industries of the vicinity. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 2880; 1910, 3054.

O'CON'OR, CHARLES (1804–84). An American lawyer. He was born in New York City and was admitted to the bar in 1824. Within a few years he was recognized as one of the most brilliant members of the New York bar. He was an active supporter of the Irish nationalist movement and for many years after 1848 was a member of the directory of the Friends of Ireland. A strong believer in the doctrine of State rights, throughout the Civil War he was warmly in sympathy with the South. After the close of the war he voluntarily offered his services as counsel for Jefferson Davis when indicted for treason, and afterward with Horace Greeley went on his bail bond. He was associated with William M. Evarts and Wheeler H. Peckham in the prosecution of the Tweed Ring conspirators, and the organization of the suits against them was largely his work. In 1872 he was nominated despite himself for President of the United States by Democrats who declined to indorse the Liberal Republican nomination of Horace Greeley. John Quincy Adams, the nominee for Vice President, also declined, but the ticket remained in the field and 21,559 votes were cast for it.

OCON'OSTO'TA (properly, *Agana-stata*, ground-hog sausage). A Cherokee chief and leader of his tribe in their war with the English colonists (1759–61). Before the outbreak of hostilities a delegation of 32 chiefs, headed by Oconostota, had come down from the mountains to arrange a peaceable settlement of the questions at issue, but by order of Governor Lyttleton of South Carolina the whole party was seized and thrown into prison at Fort Prince George. When it was thought that the Indians had been terrorized into submission, Oconostota and two others were set at liberty. Oconostota collected his warriors and besieged the post, completely cutting off communication for about two months. In February, 1760, on pretense of a desire for a conference, he decoyed the commander outside the stockade, where the officer was shot down from ambush. All the hostages in the fort were immediately massacred by the garrison in retaliation. In June, 1760, a force of 1600 under Colonel Montgomery invaded the Cherokee country and destroyed one town after another almost without resistance until Nikwasi was reached, near the present Franklin, N. C., where Montgomery was defeated and forced to retire upon Fort Prince George with heavy loss.

Six weeks later the garrison of Fort Loudon, near the present Loudon, Tenn., was compelled to surrender to Oconostota in person, on promise of permission to withdraw in safety on surrender of their war stores. Finding, however, that the compact had been broken by the concealment of a large quantity of arms and ammunition, the Indians attacked the departing troops and killed 30, including the officer in charge, holding the rest as prisoners until ransomed later. In June, 1761, Colonel Grant with 2600 men again invaded the Cherokee country, and by the destruction of their fields and settlements so nearly reduced the Indians to starvation that they were finally compelled to sue for peace. Oconostota retained his authority in his nation and in 1768 headed a delegation which, at Johnson Hall in New York, concluded a lasting peace with their old-time enemies, the Iroquois. He took no active part in the Revolutionary struggle, being already worn out by infirmities, and in 1782 formally resigned his chiefship in favor of his son. He was still living in 1809.

OCON′TO. A city and the county seat of Oconto Co., Wis., 142 miles north of Milwaukee, at the mouth of the Oconto River, on Green Bay and on the Chicago and Northwestern and the Chicago, Milwaukee, and St. Paul railroads (Map: Wisconsin, F 4). It has large lumber interests and an extensive trade in fish. The industrial establishments, besides the lumber manufactories, include flouring mills, a brewery, canning factories, knitting mills, foundry and machine shops, etc. A productive farming, stock-raising, and dairying region is adjacent to the city. There are fine courthouse and high school buildings, a hospital, and a public library. Settled in 1850, Oconto was first incorporated in 1882. It is governed, under a revised charter of 1891, by a mayor, elected every two years, and a council. Pop., 1900, 5646; 1910, 5629.

OCORONAN, ō′kô-rō′nan. An Indian language of northwestern Bolivia, South America. Brinton believes it identical with the Rocorona, in which Professor Teza has published a Pater, an Ave, and a Credo. Consult D. G. Brinton, *The American Race* (New York, 1891); Teza in *Saggi inediti di Lingue Americane;* Chamberlain, in *Journal de la Société d'Amérique de Paris*, 1910, N. S., vii, 193.

OCOTEA. See OREODAPHNE.

OC′TAGON (Gk. *ὀκτάγωνος, oktagōnos*, eight-cornered, from *ὀκτώ, oktō*, eight + *γωνία, gōnia*, angle). A polygon (q.v.) of eight sides. If the sides and angles are respectively equal, the figure is called a *regular* octagon. In this case each interior angle is 135° and each exterior angle is 45°. If the alternate vertices of a regular octagon are joined, a square is formed; and since the angle between a side of the octagon and a side of the square is one-fourth of a right angle, the regular octagon may easily be constructed from a square as a basis.

OC′TAHE′DRITE, or ANATASE. A mineral composed of titanium oxide, identical in composition with rutile and brookite, but differing in crystal habit. It crystallizes in the tetragonal system, usually in pyramidal form, has a metallic adamantine lustre, brown or black color, and a hardness of 5.5 on the mineral scale. It is found at Smithfield, R. I., in Burke Co., N. C., at Somerville, Mass., and at various localities in Europe.

OC′TAHE′DRON (Gk. *ὀκτάεδρον, oktaedron*, neut. sing. of *ὀκτάεδρος, oktaedros*, having eight bases, from *ὀκτώ, oktō*, eight + *ἕδρα, hedra*, base). A solid bounded by eight faces. If the faces are equilateral triangles, four meeting at each vertex, the figure is called a *regular* octahedron. (See POLYHEDRON.) This solid has four axes of symmetry, passing through opposite vertices, and is one of the five Platonic bodies, or regular polyhedrons.

OC′TATEUCH. See HEXATEUCH.

OC′TAVE (Fr. *octave*, from ML. *octava*, octave, from Lat. *octavus*, eighth, from *octo*, Gk. *ὀκτώ, oktō*, Skt. *aṣṭan*, Lith. *asztuni*, OIr. *ocht*, Goth. *ahtáu*, AS. *eachta*, OHG. *ahto*, Ger. *acht*, Eng. *eight*). The interval between any musical note and its most perfect concord, which is double its pitch and occupies the position of the eighth note from it on the diatonic scale. The name "octave" is often given to the eighth note itself as well as to the interval. There is between a note and its octave a far closer relation than between any other two notes; they go together almost as one musical sound. In combination they are hardly distinguishable from each other, and their harmonics agree invariably, a coincidence which occurs in the case of no other interval. For the purpose of absolute pitch every tone is regarded as belonging to a particular series of octaves. The octave from middle C (q.v.) to the C below is called the *small* octave, the next lower the *great* octave, because in numerical notation (q.v.) these tones are indicated respectively by the small and capital letters of the alphabet. The octave $C_{-1}C$ is called the *contra* octave. The octave from middle C upward is the *one-lined* octave, the next the *two-lined* octave, etc.

OCTA′VIA. The sister of the Roman Emperor Augustus, and wife of Marcus Antonius. She was distinguished for her beauty, her noble disposition, and her womanly virtues. Her first husband was C. Marcellus, to whom she was married in 50 B.C. He died in 41 B.C., shortly after which, at the bidding especially of the Roman soldiery, she consented to marry Antonius, to make secure the reconciliation between him and her brother. The event was hailed with joy by all classes. In a few years Antonius forsook her for Cleopatra. When the Parthian War broke out Octavia wished to accompany her husband, and actually went as far as Corcyra, whence Antonius sent her home, that she might not interrupt his relations with the Egyptian Queen. In 35 B.C. Octavia made an effort to rescue him from a degradation that left him indifferent even to the honor of the Roman arms, and sailed from Italy with reenforcements, but a message reached her at Athens ordering her to return home. She proudly obeyed, but, with a magnanimity that reminds us of the Roman character in earlier and better days, she forwarded the troops to her husband. Her brother was indignant at the treatment she had received, and would have had her leave her husband's house and come and live with him, but she refused. When, in 31 B.C., war, long inevitable, broke out between her brother and Antonius, the latter crowned his insults by sending Octavia a notice of divorce. After her husband's death she brought up with maternal care not only her own children, but also Antonius' children by Fulvia and by Cleopatra. Her death took place in 11 B.C. Her son Marcellus (q.v.) was adopted by Augustus as his successor, but died in 23 B.C. Consult F. F. Abbott, *Society and Politics in Ancient Rome* (New York, 1909).

OCTAVIA (c.42–62). A Roman empress, wife of Nero (q.v.). She was the daughter of Claudius and Messalina and married Nero when he was 16 and she 11. He deserted her for Acte, and then for Poppæa, at whose request she was divorced and sent to Campania. She was soon recalled because of the outburst of anger on the part of the Roman populace; but, through Poppæa's jealousy, a charge of adultery was brought against her and she was sent to the island of Pandataria and there killed when she was only 20. The tragedy *Octavia*, of which she is the heroine, usually attributed to Seneca, is probably by some other author, perhaps Curiatius Maternus. Consult, for the play, H. E. Butler, *Post-Augustan Poetry* (Oxford, 1909); E. C. Chickering, *An Introduction to Octavia Prætexta* (New York, 1910); W. S. Teuffel, *Geschichte der römischen Litteratur*, vol. ii, § 290, 7 (6th ed., Leipzig, 1910).

OCTA'VIAN. See AUGUSTUS.

OC'TOBASS. A double bass invented by Vuillaume in 1851. It is of enormous dimensions, four meters high, and has three strings (C_1, G_1, C), which are stopped by mechanism. The tone is powerful and mellow, but, owing to its enormous size, it is not used in orchestras.

OCTO'BER. See MONTH.

OCTO'BRISTS (in Russ. *Oktiabristi*), or the UNION OF THE 17TH OF OCTOBER. A conservative political party in Russia which was formed on the basis of the famous manifesto of Oct. 17 (new style, 30), 1905. (See RUSSIA.) In November, 1905, there was held in Moscow a conference of representatives from municipalities and zemstvos (see ZEMSTVO) which was to discuss the policy of the government of Witte and to devise methods for securing the realization of the constitutional promises contained in the Czar's manifesto mentioned above. The majority at this conference was in favor of calling a constitutional convention on the basis of universal and direct suffrage, and formed itself into the party of Constitutional Democrats. The minority, led by A. Guchkov, opposed the idea of a constitutional convention and direct suffrage; they represented the elements which later formed the Octobrists. On Dec. 5, 1905, a conference of the Council of Ministers was held at Tsarskoe Selo, presided over by the Czar himself. To this conference there came three Octobrists, including Guchkov, who defended universal suffrage. However, after the barricade fighting in Moscow (Dec. 7–17, 1905) and the great strikes all over the country, the Octobrists became more moderate in their views. Their motto became the conservation of unity of the Russian Empire, and they bitterly fought the demands of the Poles and of other small nationalities for local and political autonomy. (At this time, however, the Octobrists were still in favor of granting autonomy to Finland.) The new spirit in the Octobrist party was too conservative for a considerable number of members, who withdrew from the party and, under the leadership of Prince E. Troubetzkoi, formed a party of their own under the name of the Party of Peaceful Reconstruction. On Feb. 8, 1906, the Octobrists held their first convention at Moscow, at which about 400 delegates were present. The debates of the convention showed that the party still consisted of two elements, liberal and conservative. The main demands of the party at this time were for laws which would guarantee the personal and political rights promised by the manifesto of October 17. In the first and second Dumas the Octobrists formed too small a minority to have any influence on the course of parliamentary events. But after July 3, 1907, when the electoral laws were arbitrarily changed by Imperial edict in such a manner as to decrease the number of representatives from the frontier provinces and from the nonpropertied city population, the Octobrists found themselves strengthened, and in the third Duma they were the largest single political group. In the third and fourth Dumas the Octobrists continually shifted towards conservatism. The Octobrists, regardless of principles, followed the policy of gaining favor with the government, although they voted now and again against it and even censured it. This coöperation with the government forced most of the liberal elements out of the party, so that it now represents mainly the large landowners and the bureaucratic groups and only to a slight extent the large industrial and commercial interests. At the outbreak of the European War in 1914 the party, supporting the imperialistic policies of the government, acquiesced in the severe methods of Russification practiced in Poland, Finland, and the other frontier provinces.

OC'TOCORAL'LA (Neo-Lat., from Lat. *octo*, eight + *corallum*, coral). A subclass of cœlenterates. The families Alcyonidæ, Pennatulidæ, and Gorgonidæ are represented by scattered fossil remains throughout the Mesozoic and Cenozoic formations. Another family, the Helioporidæ, appears in the Tertiary and Mesozoic, and seems to be represented in the Paleozoic by the Heliolitidæ, an important group of reef-building corals of somewhat uncertain affinity that exhibits analogies to the Favositidæ and Chætetidæ. See CORAL; HELIOLITES.

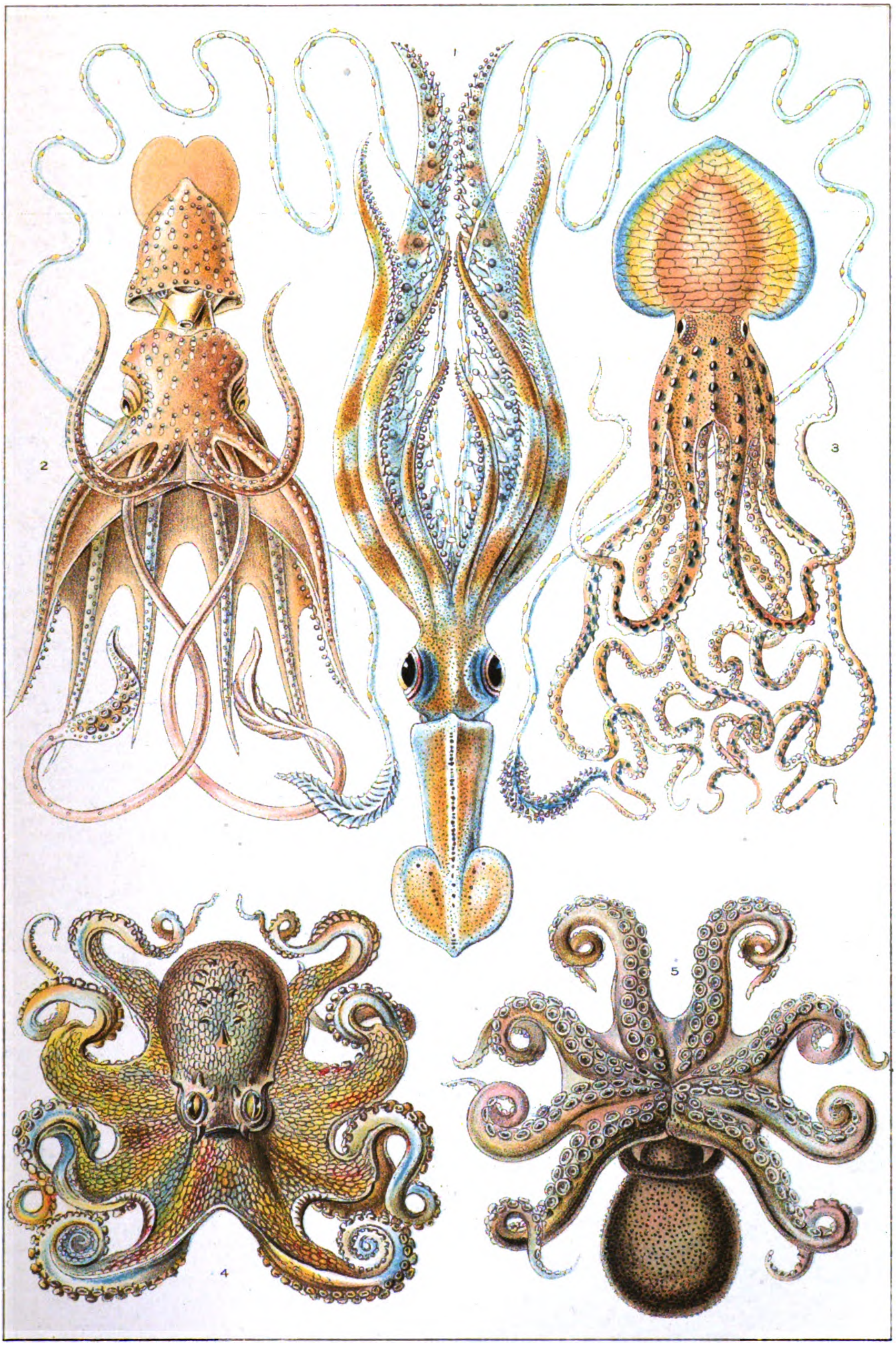
OCTODU'RUM. See MARTIGNY.

OCTOP'ODA (Neo-Lat. nom. pl., from Gk. ὀκτώπους, *oktōpous*, having eight feet, from ὀκτώ, *oktō*, eight + πούς, *pous*, foot). An order of dibranchiate cephalopods having eight arms, the suckers on which are sessile and devoid of horny rims. It includes the argonaut and the various species of *Octopus* (qq.v.).

OC'TOPUS, more correctly but less frequently octo'pus (Neo-Lat., from Gk. ὀκτώπους, *oktōpous*, having eight feet). The type genus of the Octopoda (q.v.), differing from the squid and cuttlefish in having 8 instead of 10 arms, all of the same size, and a pear-shaped or sack-like body. The arms are connected at the base by a web. Two cartilaginous stylets embedded in the dorsal mantle are said by Owen to represent the shell. The body of the poulp, devilfish, or octopus is baggy, short, soft, with no fins. It lives in interstices of coral reefs, among rocks, and the like. The right arm of the third pair is hectocotylized in the male, i.e., the arm is modified in various ways, but is never de-

A HECTOCOTYLIZED ARM.

OCTOPODS AND DECAPODS



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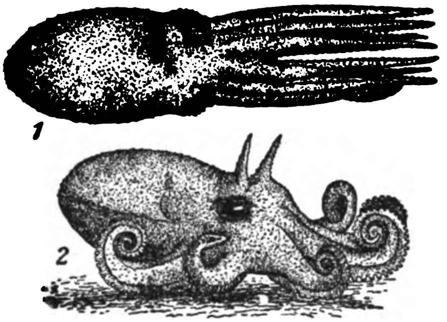
1 CHIROTEUTHIS VERANYI 3 PINNOCTOPUS CORDIFORMIS.
2 HISTIOTEUTHIS RUPPELLII 4 COMMON OCTOPUS (OCTOPUS VULGARIS)
5 OCTOPUS GRANULATUS.

tached and left within the female, as in the argonauts. The best-known species is *Octopus vulgaris*, of the Mediterranean and West Indies, which may reach a length of 9 feet and weigh upward of 60 pounds. A tropical species (*Octopus granulatus*) is shown on the Colored Plate of OCTOPODS AND DECAPODS.

Octopus bairdii inhabits the New England coast at a depth of from 50 to 100 fathoms. On the southern coast of the eastern United States from Cape Hatteras down is an octopus whose arms expand nearly 4 feet. The Pacific coast species is *Octopus punctatus*, which is known to expand 14 feet from tip to tip of the outstretched arms. It lives just below low-water mark, and is caught and impaled by means of a pointed stick by Chinese and Italians, who use it as an article of food. At times pearl divers and shell collectors on the coral reefs may be attacked and hurt by octopods, as they are armed with formidable teeth; the difficulty of tearing away their arms and the fright caused by their hideous appearance are said to have resulted in death. The ordinary food of this animal is shellfish and other invertebrates. Consult: *The Standard Natural History* (Boston, 1885); Cooke, in *Cambridge Natural History*, vol. iii (London, 1895); A. S. Packard, *Zoölogy* (New York, 1904).



OCTOPUS BAIRDII.

1, attitude in swimming (towards the left). 2, attitude when at rest.

OC'TOSTYLE (Lat. *octastylus*, from Gk. ὀκτάστυλος, *oktastylos*, having eight columns, from ὀκτώ, *oktō*, eight + στῦλος, *stylos*, column). The name given in classic architecture to a temple or other building with eight columns across the front. See GREEK ART, *Architecture*, The Temple.

OCTROI, ŏk'trwä' (Fr., grant). The term applied to the toll or tax in kind levied from a very early period in France and other countries of Europe on articles of food which were brought past the barrier or entrance of a city or town. The octroi came eventually to be levied in money, and was abolished in France at the Revolution. In 1799, however, it was reëstablished, under the pretext that it was required for purposes of charity, and since then it has been successively changed and modified. The proceeds of the octroi duty which is at present levied at the gates of the French towns are divided so that one-tenth goes to the national treasury and the rest to local expenses. These duties are allowed on drinks, eatables, fuel, fodder, and building materials. A new octroi must be established by statute, and every increase in the rates requires the approval of the higher authorities. The octroi duties are not popular, since they increase considerably the cost of living in towns and cities; but it would be difficult to abolish them, since the towns depend upon them very largely for revenue. Outside of France they are found also in Italy and in a few towns of Bavaria and Austria.

OCULAR. See EYEPIECE.

O'CUR'RY, EUGENE (1796–1862). A British Gaelic scholar. He was born at Dunaha, County Clare, Ireland. From 1834 to 1837 he was employed in the topographical and historical section of the Ordnance Survey. By many years spent in copying important Irish manuscripts for the Royal Irish Academy, Trinity College (Dublin), the British Museum, and other institutions, O'Curry acquired a remarkable knowledge of these historical sources. When well past middle life (1851) he contributed to a work by Dr. Reeves a translation of some Irish poems in the Codex Maelbrighte. In 1853 he became a member of the council of the newly organized Celtic Society, which published his edition of the *Battle of Magh Leana and Tochmarc Momera* (1855). His first course of lectures as professor of Irish history and archæology in the Catholic University at Dublin (1855–56) was published (1861) as *The Manuscript Materials of Ancient Irish History* (2d ed., 1878). The substance of later lectures appeared posthumously, *On the Manners and Customs of the Ancient Irish People*, edited by W. K. Sullivan (2 vols., 1873). With John O'Donovan (q.v.) O'Curry labored on the compilation of the ancient laws and institutions of Ireland. For an appreciation of his work, consult Douglas Hyde, *Literary History of Ireland* (London, 1906); also the *Memoir* in the *Irish Monthly Magazine* (Dublin, April, 1874); Webb, *Compendium of Irish Biography* (ib., 1878).

O'CYDROME. A form of rail. See WEKA.

O'DAL, or **U'DAL** (from Icel. *oþal*, AS. *ēþel*, OHG. *uodil*, hereditary possession; connected with Icel. *aþal*, OHG. *adal*, Ger. *Adel*, race, nobility). The name of an ancient system of land tenure in northern Europe, in which the land was held absolutely, and not from a superior, as was the case where feudalism prevailed. The odal tenure prevails to this day to a large extent in the Orkney and Shetland islands, the right to land being complete, without writing, by undisturbed possession proved by witnesses before an inquest. Consult William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897).

ODD FELLOWS, INDEPENDENT ORDER OF. An international, secret, fraternal, beneficiary society, with headquarters in the United States. It has no life-insurance features. The history of its English Odd Fellow society progenitors runs back to about 1745. The early English order appeared about 25 years after the modern revival of Freemasonry in 1717, at London. Fragmentary historic records and conjecture intimate that the first English Odd Fellows' lodges were an outgrowth of rivalry to the Masons, who had acquired prominence in the early half of the eighteenth century, particularly among the so-called upper classes, in the army, navy, diplomatic service, and among the nobility. There is a story that some disgruntled Masons were founders of one of the early English Odd Fellows' lodges.

The distinctive feature of the order, not only the early English branches but also those resulting from consolidations and from schism, as well as the now independent American child of English Odd Fellowship, is found in their being based on definitely expressed obligations to care systematically, financially, and otherwise for sick, distressed, and dependent members and their families. That Odd Fellowship in England was the fount from which flowed the stream of nonsecret friendly societies there is no doubt; and it was the activities of the latter that suggested the flood of American secret, assessment, life-insurance, and beneficiary societies of the last 50 years.

The earliest recorded English Odd Fellows' lodge is that of Aristarchus, No. 9, which, in 1748, met at the Globe Tavern, London. Similar lodges were known to have existed in England perhaps a dozen years before that, an early adaptation of the secret, beneficiary society scheme among the wage-earning and middle classes. Since then the various orders of Odd Fellows have extended their membership to and in all ranks of society. Defoe mentioned the Odd Fellows in his writings and Montgomery, the British poet, in his verse. During the latter part of the eighteenth century dissensions, rivalries, and schism wrought many separate independent English orders of Odd Fellows having no official connection with one another.

Almost all secret society meetings in the United Kingdom, except those of the Masons, were proscribed by the British government late in the eighteenth century, and the Odd Fellows, Orangemen, and friendly societies of that time suffered accordingly. There was a revival of activity early in the nineteenth century, and a Grand Lodge of Odd Fellows for England was formed at London in 1803. In 1809 one of its subordinate lodges at Manchester declared itself independent and started as a Grand Lodge to form a new order of Odd Fellows. By 1813 the Independent Order of Odd Fellows, Manchester Unity, had become fully established and constitutes the largest English branch of the order to this day. Other English Odd Fellows' societies, some of them running back to or into the eighteenth century, include the Imperial, of Nottingham; Ancient, of Bolton; Grand United, of Sheffield (described as the parent stem); the Economical, of Leeds; the National, of Salford; the Kingston, and half a dozen others, some of which are now extinct.

The Manchester Unity was responsible for the introduction of the order into the United States in 1819. In 1820 English lodges of Odd Fellows were formed in Wales, in Scotland in 1838, and in Ireland, Germany, and Australia in 1840. In 1843 the Grand United Order of Odd Fellows of England established a lodge in the United States, petitioners for the same being negroes. The American Independent Order of Odd Fellows had previously refused such a petition on the ground of racial incompatibility. The English Grand United Order found fertile soil among colored men in the United States, and has continued to establish lodges upon application from them ever since. It thus has a white membership in England and black in the United States. This explains the apparent anomaly of the existence of colored Odd Fellowship in the United States side by side but not connected with an order having a similar but not the same name.

Some membership grand totals, in part officially and some otherwise estimated, of the various independent and disconnected Odd Fellows' societies throughout the world, are as follows:

Grand United (parent English) Order	150,000
Manchester Unity (England)	1,100,000
Nottingham and Ancient Noble Order (England)	100,000
National Independent Order (England)	75,000
18 other English Orders	100,000
Approximate total	1,525,000
Independent Order, in United States (men)	1,508,791
Independent Order of the United States, abroad	163,867
Independent Order (United States and Canada), women	726,991
Total, Independent Order United States and abroad	2,399,649
Grand United Order in United States (negroes)	150,000
Approximate grand total, all branches of Odd Fellows in the world	4,074,649

The American Independent Order of Odd Fellows far outstrips in number of members all other similar societies with a like title, being the largest secret society in the world when its 726,000 women members, known as Daughters of Rebekah, are taken into account. Relying solely on a comparison as to male membership, the American Independent Order is easily the second largest, although all but a small percentage of its members reside in the United States, as shown on page 365.

The organized beginning of activities of Odd Fellowship in the United States was in 1819. In that year Thomas Wildey, John Welch, John Duncan, John Cheatham, and Richard Rushworth, of Baltimore, Englishmen and Odd Fellows who had recently emigrated to the United States, organized Washington Lodge, No. 1, Independent Order of Odd Fellows, Manchester Unity, under a charter from that English order. Wildey was its first Noble Grand and ranks as the founder of the order in the United States. The second lodge was Franklin, No. 2, also in Baltimore, Washington, No. 1, having been created a grand lodge of Maryland as well as of the United States. This was changed in 1821, and Washington Lodge became a subordinate body. The general government of the order was modeled somewhat from that of the United States, subordinate lodges being controlled by State or grand lodges, and the latter by a supreme grand lodge for the order at large. The first German Odd Fellows' lodge was formed in 1827. Odd Fellowship suffered from the Antimasonic agitation of 1827–35, but soon thereafter recovered its rapid rate of progress. In 1843 the American order declared itself independent of the mother Manchester Unity order and has since remained an entirely distinct organization. Reasons for that separation have never been fully explained beyond a general statement that the desire to become independent was general and that too many dependent British Odd Fellows were calling for assistance from the United States during the period when immigration began to show itself conspicuously during the first half of the last century.

There were a number of Odd Fellows' lodges established at New York City and Brooklyn prior to 1819. These did not give up their charters and join the Wildey organization in all instances until as late as the close of the Civil War.

The Grand Lodge of the United States formally carried Odd Fellowship to Montreal, Quebec, in 1843, and by 1846 the Canadian branch of the order declared itself independent under grand lodges of its own. But this did not last long, and again the Grand Lodge of the United States invaded the Dominion and resumed jurisdiction. Since that time the Sovereign Grand Lodge of the Independent Order of Odd Fellows of the United States, as it has been called since 1879, has established lodges in Mexico, West Indies, Chile, Cuba, Peru, Japan, Denmark, Germany, England (in friendly rivalry with its mother fraternity), in France, Italy, Holland, and other countries. But the American order has not worked well in all of them, and in a few has virtually died out.

DETAILED TOTALS OF MEMBERSHIP, I. O. O. F.*

MEMBERSHIP JAN. 1, 1914	Lodge members	Rebekah (women) members	Encampment members	Canton members
Alabama	20,016	2,428	753	....
Arizona	2,194	1,374	379	83
Arkansas	24,482	7,395	1,289	112
California	46,099	33,791	9,146	1,803
Colorado	14,082	8,905	2,033	603
Connecticut	23,648	7,986	5,030	254
Delaware	3,426	347	374	46
Dist. of Columbia	1,815	806	319	118
Florida	4,229	1,577	423	34
Georgia	33,092	2,620	2,729	168
Idaho	8,174	5,257	1,325	277
Illinois	105,062	57,088	13,721	1,159
Indiana	84,044	46,912	18,390	975
Iowa	59,199	41,769	10,701	1,431
Kansas	49,456	29,042	4,957	644
Kentucky	28,372	4,351	2,401	142
Louisiana	4,506	1,141	474	104
Maine	26,042	23,330	5,567	1,264
Maryland	14,184	2,976	1,930	244
Massachusetts	60,436	34,514	1,635	1,194
Michigan	62,200	40,368	11,690	1,195
Minnesota	23,032	13,273	3,310	826
Mississippi	2,946	212	164	21
Missouri	63,657	30,235	6,474	415
Montana	6,305	2,913	827	289
Nebraska	24,694	14,625	2,715	579
Nevada	1,596	1,367	265	25
New Hampshire	15,513	16,091	3,527	687
New Jersey	30,332	4,117	3,285	163
New Mexico	2,471	1,645	337	30
New York	126,294	49,830	17,463	2,343
North Carolina	16,299	2,594	1,166	128
North Dakota	7,245	3,519	844	155
Ohio	87,788	45,812	17,665	1,848
Oklahoma	33,850	13,388	1,825	189
Oregon	19,691	16,655	4,380	547
Pennsylvania	157,751	30,780	19,147	1,704
Rhode Island	6,430	3,615	1,074	48
South Carolina	3,350	765	317	....
South Dakota	12,658	8,554	2,182	264
Tennessee	31,527	5,375	1,736	227
Texas	43,242	22,691	2,283	529
Utah	3,305	1,407	586	124
Vermont	7,589	6,688	1,793	449
Virginia	28,639	2,538	1,883	226
Washington	27,942	22,302	5,907	667
West Virginia	27,038	6,506	5,017	298
Wisconsin	19,732	12,270	3,419	462
Wyoming	3,118	1,892	738	92
Totals	1,508,791	695,636	215,014	25,185
Australia	45,300	....	....	......
Canada and Maritime Provinces	100,305	31,355	13,872	1,468
Denmark	3,487	....	....	28
Germany	6,692	....	....	......
Netherlands	696	....	....	......
Sweden	6,819	....	....	......
Switzerland	586	....	....	......
Totals	163,867	31,355	13,872	1,496
Grand totals	1,672,658	726,991	228,886	26,681

* Returns as to the total number of Odd Fellows Jan. 1, 1914, in outlying possessions of the United States not included in the regular statement, and in those foreign countries not given above, are: Alaska, 256; Hawaii, 281; Philippines, 91; Porto Rico, 27; total, 655. Argentine Republic, 20; Cuba, 221; Japan, 55; Panama, 260; total, 556.

Odd Fellows' lodges confer three degrees. Any member of the third degree is eligible to membership in the Encampment, which branch or department dates back to 1827. Three degrees are conferred there also. Membership in an Encampment depends upon good standing in the lodge. In other respects they are independent.

A uniformed degree of the order called Patriarchs Militant was formed in 1884. Only Encampment members who have taken the Royal Purple degree are eligible. The Patriarchs are the military end of Odd Fellowship. The subordinate bodies to which they are attached are known as cantons, each commanded by a captain. Cantons are organized into battalions, regiments, brigades, and divisions, with officers of corresponding rank, but the Grand Sire, the presiding officer of the Sovereign Grand Lodge of the order, is ex-officio general in chief.

The Rebekah degree for women members was established in 1851. There is a universal sign known to all the women members of the Rebekah degree, as well as to all men who are members of lodges of the Independent Order of Odd Fellows, to enable them to identify themselves to one another.

Odd Fellows' Homes, established for the care of orphans of Odd Fellows, indigent or other dependent members, or members of their families, are found in almost every State of the Union. The present value of such institutions, practical charitable plants, is stated to be more than $5,000,000. The order throughout the world has 68 grand lodges, 57 grand encampments, nearly 18,200 subordinate lodges, nearly 3600 subordinate encampments, and about 9800 Rebekah lodges. The total number of male members of lodges of Odd Fellows recognizing the jurisdiction of the Sovereign Grand Lodge of the United States is more than 1,673,000.

The total amount of relief extended by the order in the calendar year 1913 represented a cash outlay of $6,186,015, while invested funds of the State or grand lodges and subordinate bodies, Jan. 1, 1914, amounted to $66,163,274. The total amount of relief extended by the order from 1830 to Jan. 1, 1914, was $154,656,000. Consult: Ford, *Symbolism of Odd Fellowship* (Providence, 1904); A. C. Stevens (comp.), *Cyclopædia of Fraternities* (2d ed., New York, 1907); G. H. Fuller, *Directory of Subordinate Lodges of the I. O. O. F. on the Continent of North America* (Boston, 1913); *Annual Proceedings of the Sovereign Grand Lodge, I. O. O. F.* (Baltimore).

ODE (Gk. ᾠδή, *song*, from ἀείδειν, *aeidein*, to sing). Originally, a poem to be sung to the accompaniment of some musical instrument, as the lyre. The poem and the music were inseparable. The simpler form of the Greek ode for a single voice was cultivated by Sappho, Alcæus, Anacreon, and other Æolian poets. The choral ode to be sung, not by a single voice, but by a group, was invented by the Dorians. To Alcman of Sparta belongs the innovation of dividing the chorus into two parts, called the strophe (the turn) and the antistrophe (the counterturn), in which the performers turn to the right and to the left, the one group answering the other. Stesichorus of Sicily added a third part called the epode (after song), which was sung by the entire chorus after their movements to the right and to the left. The choral ode, consisting thus of the strophe, the antistrophe, and the epode, was adapted by Simonides of Ceos to the warlike Dorian music. He was followed by Pindar, the greatest lyric poet of Greece. Of Pindar's work there are extant, besides several fragments, 44 odes of victory, composed for the national games. Each ode has its own complicated metrical structure corresponding to its own music. The simpler Greek measures were imitated in Latin by Catullus and Horace. See Greek Music.

The modern ode, dating from the Renaissance, was inspired by Horace and Pindar. It has, of course, undergone many modifications, consequent upon the divorce of verse and musical accompaniment. But it generally shows whence it came by its stanzaic structure and its direct address to some person or object. It is exalted in tone, more impersonal than the ordinary lyric, and it deals progressively with a single dignified theme. Among the first English writers of odes in imitation of Horace or Pindar, or of both, are Ben Jonson, Crashaw, Milton, Cowley, Marvell, Dryden, Collins, and Gray. Marvell's ode on the return of Cromwell from Ireland is one of the best in the Horatian manner; but Gray best understood Pindar. Gray divides his *Progress of Poesy* into three stanzas, each having 41 lines; each stanza is further divided into strophe, antistrophe, and epode, and the three parts of each stanza are identical in form. Collins, with admirable art, employed a less elaborate structure, and most English poets have followed him rather than Gray. Indeed, the ode as now written is only a succession of stanzas in lines of varying length and metre. The irregular ode is thus the most purely subjective of lyric forms and capable of the most delicate adjustments of music and mood; but, because of its very pliancy, it is also perhaps the one form in which success is least often attained. Of musical settings for odes the most famous are those of Purcell, 28 in number, and the four by Handel.

Among the great English odes of the nineteenth century are Wordsworth's *To Duty* and *Intimations of Immortality;* Coleridge's *To France;* Shelley's *To the West Wind, To Liberty, To Naples,* and *To a Skylark;* Keats's *To a Nightingale, To Autumn,* and *On a Grecian Urn;* Tennyson's *On the Death of the Duke of Wellington;* and Swinburne's *To Victor Hugo.* Among American odes Lowell's great *Commemoration Ode* to the Harvard students and graduates who fell in the Civil War is memorable. Consult: E. W. Gosse (ed.), *English Odes* (New York, 1881); William Sharp (ed.), *Great Odes, English and American* (London, 1890); Clinton Scollard (ed.), *Odes and Elegies* (New York, 1905); and for more recent odes, the poems of Coventry Patmore and William Watson. See also the various poets mentioned in this article, and Lyric Poetry.

ODELL', Benjamin B(arker), Jr. (1854–). An American political leader, born at Newburgh, N. Y. He studied at Bethany College, W. Va., in 1873 and at Columbia University in 1873–75 and then engaged in banking and commercial undertakings. He was a member of the New York State Republican Committee (1884–96) and chairman of the Executive Committee (1898–1900). From 1895 to 1899 he was a member of Congress, and was chairman of the Committee on Accounts during the Fifty-fifth Congress. In 1901–04 he was Governor of New York. He had been chosen chairman of the Republican State Committee before he was Governor, and as such controlled his party's "machine" in the State until 1905, when a difference with Governor Higgins caused his defeat and the election of Timothy L. Woodruff to the State chairmanship.

ODELL, Jonathan (1737–1818). An American loyalist poet, born in Newark, N. J. After graduating in 1754 at the College of New Jersey, then in Newark, he studied medicine and was a surgeon in the British army. In 1766 he took orders and shortly afterward became rector of the church at Burlington, N. J. He was devoted to the Loyalist cause during the Revolution, was driven out, and on the evacuation of New York went to England; but he later filled positions in the Council of the Province of New Brunswick. He died in Fredericton, N. B. Odell was the most effective satirist on the Tory side. His verses, with those of Joseph Stansbury, were collected in 1860 by Winthrop Sargent.

OD'ENA'THUS, or **OD'ÆNA'THUS**. King of Palmyra and husband of the celebrated Zenobia. See Palmyra; Zenobia.

ÖDENBURG, ẽ'den-bụrk (Hung. *Sopron*). A royal free city and capital of the county of the same name in Hungary, situated a short distance from the Neusiedler Lake and 37 miles southeast of Vienna (Map: Hungary, E 3). It is a fine town with a number of churches and monasteries, a new palace of justice, a theatre, a casino, a higher Gymnasium and Realschule, a teachers' seminary, a Protestant lyceum, and a number of other educational establishments. The vicinity of Oedenburg has long been famous for its wine and fruit. The manufactures of the town include sugar, vinegar, preserved fruit, agricultural implements, soap, starch, church bells, caoutchouc, fire engines, bricks, vehicles, cotton textiles, and candied fruit. The trade is mostly in agricultural products. Oedenburg is identified with the Roman Sopronium. Pop., 1900, 30,628; 1910, 31,597, mostly German Catholics.

ODENKIRCHEN, ō'den-kẽrk'en. A town in the Rhine Province, Prussia, on the Niers, 25 miles northwest of Cologne. Its institutions include a Roman Catholic teachers' seminary and a school of agriculture. It has manufactures of velvets, silks, linen, woolen and cotton goods, leather, harness, and sealskin. Pop., 1900, 14,745; 1910, 20,060.

ODENSE, ō'den-så. The largest city on the island of Fünen, Denmark, capital of Odense Amt, constituting the northern half of the island, and the third city in population in the Kingdom. It is situated on the Odense River near its mouth in the Odense Fiord (Map: Denmark, D 3). Its streets are well paved, and the city has many handsome modern houses. It is lighted by gas and electricity and was the first city in Denmark to have water distributed to the houses through pipes. The most notable building is the cathedral of St. Canute, built in the thirteenth century, the best example of Gothic architecture in Denmark. Here are buried several distinguished Danish monarchs. The church of Our Lady, built in the twelfth century, is the oldest edifice in the town. Other buildings worthy of note are the Odense Castle, erected by Frederick IV and surrounded by a beautiful park, the large monumental city hall, and the new post office. The chief educational institutions are a seminary, a technical and an agricultural school, two libraries of 36,000 volumes each, and an archæological museum.

The city is of great industrial and commercial importance. The chief industrial establishments are breweries, distilleries, glass, chemical, and tobacco factories, machine shops, textile mills, and sugar refineries. The harbor consists of two elongated basins forming the forked extremity of the Odense Ship Canal, opening into the fiord. Further improvements and extensions are now being made, and the town is the chief railroad and commercial centre of Fünen, exporting butter, cheese, hides, and bacon in considerable quantities. Pop., 1890, 30,277; 1911, 42,237.

Odense dates from the legendary period of Danish history. It became a bishop's see early in the eleventh century, and several councils of archbishops were held here. In the sixteenth century the city was the meeting place of several parliaments. It suffered severely during the Swedish occupation in 1658–60. Odense is the birthplace of Hans Christian Andersen. The house of his youth has been turned into an Andersen museum.

ODENWALD, ō′den-vält. A mountain region in south Germany, covering parts of Hesse and north Baden. It lies east of the Rhine, between the Main and the Neckar, the latter separating it from the northern extension of the Black Forest and the former from the Taunus Range (Map: Germany, C 4). The eastern part, which consists mainly of sandstones, is the more level and slopes gradually towards the plain. The western part consists of granite, gneiss, and crystalline slate and falls abruptly towards the Rhine valley. There are many beautiful valleys, and several peaks reaching a height of about 2000 feet, the highest being Katzenbuckel, 2057 feet.

ODÉON, ō′dâ′ôɴ′. A theatre in Paris, opposite the gardens of the Luxembourg Palace, ranking next to the Théâtre Français, and devoted chiefly to classical dramas. The theatre was erected in 1782, was several times destroyed by fire and restored under various names.

ODER, ō′dẽr. One of the principal rivers of Germany (Map: Germany, F 2). It rises on a southern extension of the Sudetic Mountains, near Olmütz in Moravia, and flows in a generally northwest direction through Prussian Silesia, Brandenburg, and Pomerania. It empties into the Stettiner Haff, from which its waters flow into the Baltic Sea through three arms which form the islands of Usedom and Wollin. Its length is 562 miles. Only in its extreme upper course does it flow through a hilly and forested country; for the greater part of its length its banks are low and flat, often marshy, and in some places diversified with sand dunes. In its lower course it divides repeatedly into parallel arms, which in the last 20 miles form a long, narrow delta. The river is in general shallow, the current is very swift, and there are sudden and great variations in volume. In spite of extensive and costly engineering works necessary to confine it to its bed and render it navigable, in dry summers navigation is still uncertain. The total navigable length for small vessels is 445 miles, ending at Ratibor in south Silesia. Seagoing vessels can ascend as far as Stettin, at the head of the Stettiner Haff, but the chief port used by ocean commerce is Swinemünde, on the central outlet into the Baltic. Its upper courses, about Breslau have been canalized, and above Frankfort it is connected with the Spree by the Friedrich Wilhelm Canal. The principal tributary of the Oder is the Warthe, which rises in Poland and nearly equals the main river in size. The chief cities on the Oder are Stettin, Frankfort (Brandenburg), Breslau, and Oppeln. Consult: *Der Oderstrom, sein Stromgebiet und seine wichtigsten Nebenflüsse* (Berlin, 1896); Brämer, "Die Oder und ihr Gebiet," in *Zeitschrift des königlichen preussischen statistischen Bureaus* (ib., 1899); Walter Tietze, *Die Oderschiffahrt* (Breslau, 1906).

ODESSA. The most important city and seaport of south Russia and the fourth city of the Empire in population, situated in the Government of Kherson, on an elevation sloping towards an inlet of the Black Sea (Map: Russia, D 5). It lies about 32 miles northeast of the mouth of the Dniester and 938 miles by rail southwest of Moscow. The general appearance and atmosphere of Odessa are rather West European than Russian. The climate is temperate, the annual temperature being about 48° F., ranging from 72° F. in July to about 23° F. in January. Its rainfall is scanty. The city was built up during the nineteenth century and is therefore one of the youngest among the large cities of Russia, yet it is already one of the handsomest. It is regularly laid out around the bay and has a number of fine streets, crossing each other at right angles and well shaded, and squares unsurpassed in beauty, which afford a magnificent view of the sea. The most popular boulevard is the Nikolayevsky, which extends for 500 yards along the slope above the harbor and from which a stairway 40 feet wide leads to the bay. At the head of the stairway is the bronze statue of the Duc de Richelieu, the first Governor of the district, to whom Odessa owes much of its progress and architectural beauty.

There are many fine buildings, both ecclesiastical and secular. The chief among them are the cathedral, the exchange, the theatre, the Imperial Palace (now the residence of the Governor of the Odessa Military District), the city hall, the municipal library, containing (1913) 177,097 volumes, and the university building. Monuments to Alexander II, Catharine II, Pushkin, and other makers of Russian history adorn various sections of the town. There are about 25 orthodox churches, a number of monasteries, synagogues, and a few reformed churches. In the southern and eastern parts of the city are situated a number of parks, among which the chief are the Alexandrovsky Park and the Botanical Garden. At the head of the educational institutions is the Novo-Rossaisky Universitet, founded in 1865 and having faculties of medicine, philosophy, law, history and philology, physics and mathematics. The number of its students was 2272 in 1914. It has a very large library, a museum, and an observatory. Besides the university there are a number of secondary schools, both classical and technical Gymnasia, preparatory schools, commercial, art, and industrial schools. Odessa has various learned societies, 10 theatres, and a number of philanthropic institutions. It is the see of an archbishop of the Orthodox Greek church and the headquarters of the Eighth Army Corps. The city is well lighted by gas and electricity, and water is conducted from the Dniester, more than 26 miles away. The harbor is modern, very extensive, of sufficient depth for the admission of deep-draft vessels, and is divided by large moles into six ports. Over 700 steamers, with a total tonnage exceeding 1,450,000, entered this harbor in 1912.

While Odessa is primarily a commercial city, it is also of considerable industrial importance. In 1910 it had about 450 large industrial establishments, employing about 21,000 workmen and with an output approximating $50,000,000 in value. The chief industries are flour mills, sugar refineries, match factories, breweries, tanneries, soap factories, ironworks, etc. Situated on the coast of one of the largest grain-producing areas of Russia and in close proximity to the estuaries of the Dnieper and the Dniester, the city is naturally well equipped for its position as the chief grain-exporting centre of Russia and as the first Russian port in regard to exports in general. Its exports in 1912, chiefly grain and flour, were valued at over 80,000,000 rubles. The other articles of export include sugar, wool, and lumber. Only two ports in Russia—those of Reval and St. Petersburg—surpass the volume of imports reaching Odessa, which include machinery, coal, raw cotton, chemicals, rice, fruit, tea, tobacco, cement, etc., most of it destined for Moscow, St. Petersburg, Kharkov, and Batum.

At the head of the administration of the city is the prefect (Grádonatchalnik), appointed by the central government. The municipal assembly, or duma, consists of 60 members, elected by all citizens owning real estate. The mayor is elected by the city council. The budget of the city exceeds $2,000,000. For further details as to municipal government, see RUSSIA, *Government*.

The environs of Odessa are very picturesque and afford numerous seacoast resorts. The three salt-water lakes, or limans, Kuyalnik, Khaji-Bey, and Klein Liebenthal, are much frequented by invalids. As the city is continually expanding, much suburban territory constantly passes within city limits. The population, which is cosmopolitan to an unusual degree, increased with remarkable rapidity during the last century. The first settlers were mostly Greeks, Italians, and Albanians, and in 1802 numbered 9000. Pop., 1901, 450,218, of whom nearly one-third were Jews; 1911, 620,155, of whom about 30,000 were foreigners. Its floating population is also large.

Odessa is the intellectual and commercial capital of what is known as Novorossiya (New Russia), which includes the governments of Bessarabia and Kherson. It takes its name from the Greek settlement, Odessus, which existed here in ancient times. In the fifteenth century the Turks constructed on the present site the fortress of Khaji-Bey, which was taken by the Russians in 1789. In 1793 the place was fortified by the Russians. The growth of the town was fostered by Paul I and by the Duc de Richelieu. In 1817 it was declared a free port, and this decree, remaining in force till 1859, made possible Odessa's commercial supremacy in south Russia. In 1854 it was bombarded by the allied English and French naval forces, while in 1876–77 it was blockaded (unsuccessfully) by the Turks. In 1905–06, following the proclamation of a constitution for the Russian Empire and the ensuing reaction, Odessa was the scene of serious revolutionary and anti-Semitic outbreaks, in which many lives and much property were destroyed. It was then, too, that the sensational Black Sea fleet terrorized the city. Its port was temporarily closed during the Balkan War of 1912–13. During the European War which began in 1914 Odessa was bombarded by the Turkish fleet. See RUSSIA; WAR IN EUROPE.

ODE'UM (Lat., from Gk. *ᾠδεῖον*, *ōdeion*, from *ᾠδή*, *ōdē*, song). The Greek name for a public building devoted to musical performances; it differed from a theatre in having a room and in being much smaller. The earliest odeum in Athens seems to have been built by Pericles (c.445 B.C.) and was a circular building with a conical roof in imitation of the tent of Xerxes. It had many pillars within, consisting of the masts of ships captured from the Persians, and thus did not resemble the theatre. It was intended for the musical competitions at the Panathenæa, but was later used for other purposes. It was burned during Sulla's siege of Athens (86 B.C.), but was soon rebuilt by Ariobarzanes II, King of Cappadocia. In Roman times the name was employed to designate a small theatre with a roof, and such buildings became common in Grecian cities. In Athens there were two: one erected by Agrippa, near the market; the other, of which the walls still remain, at the southwest corner of the Acropolis, built by Herodes Atticus shortly after 160 A.D. in memory of his wife, Regilla. The ceiling of the odeum of Herodes was made of beams of cedar wood, finely carved; we may suppose that there was an opening in the centre of the roof to admit light. Consult W. Dörpfeld, "Die verschiedenen Odeen in Athen," in *Mittheilungen des deutschen archäologischen Instituts in Athen*, vol. xvii (Athens, 1892), and M. L. D'Ooge, *The Acropolis of Athens* (New York, 1908). There was an odeum also at Patræ and at Corinth and in various centres of Asia Minor, e.g., Smyrna and Tralles. There were two at Rome. The smaller theatre at Pompeii also was an odeum. Consult Mau-Kelsey, *Pompeii: Its Life and Art* (2d ed., New York, 1902).

ODEYPORE. See UDAIPUR.

ODGERS, ŏj'ẽrz, WILLIAM BLAKE (1849–). An English legal scholar, born in Plymouth, the son of a Unitarian minister. He was educated at University College, London, and at Trinity Hall, Cambridge, and in 1873 became a barrister of the Inner Temple. He was recorder of Winchester in 1897–1900, of Plymouth from 1900 to 1912, and then of Bristol; in 1905 he became director of legal studies at the Inns of Court and in 1907 professor of law at Gresham College. His books are cited as *Odgers on Libel and Slander* (1881), *on Pleading and Practice* (1891), *on Local Government* (1899), and *on the Common Law of England* (1911).

O'DIN (ONorse *Oðinn*, AS. *Wōden*, OHG. *Wōdan*, *Wuotan*; probably connected with Goth. *wōds*, possessed, AS. *wōd*, OHG. *wuot*, frenzied, Ger. *Wut*, frenzy, OIr. *fáith*, Lat. *vates*, poet). The chief god of Northern mythology. According to the sagas, Odin and his brothers, Víli and Vé, the sons of Börr, or the first-born, slew Ymir, or Chaos, and from his body created the world, converting his flesh into dry land; his blood, which at first occasioned a flood, into the sea; his bones into mountains; his skull into the vault of heaven; and his brows into the spot known as Midgard, the middle part of the earth, intended for the habitation of men. Odin rules heaven and earth and is omniscient. His seat is Valaskjálf, from whence his two black ravens, Huginn (Thought) and Muninn (Memory), fly daily to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. By drinking from Mimir's fountain he became the wisest of gods and men, but he purchased the distinction at the cost of one eye. Frigg is his queen and the mother of Balder, but he has other wives and favorites and numerous sons and daughters. Consult R. B. Anderson, *Norse Mythology* (Chicago, 1875; 7th ed., 1901; Norw. trans., Christiania, 1877; Fr., Ger., Ital. trans.). See Æsir.

O'DO, Duke of Aquitaine. See Eudes.

ODO, or **EUDES**, ẽd, of Bayeux (c.1036–97). The half-brother of William I of England. He was made Bishop of Bayeux about 1049. He took part in the Norman conquest of England in 1066 and received the Earldom of Kent, but it is possible that he never received the title of Earl. During William's absence from England in 1067 he was one of the two regents and seems to have ruled very tyrannically. Later he fell under William's displeasure and was imprisoned for four years. He was released by William just before the latter's death. He rebelled against William Rufus in 1088 and had to leave England. He died at Palermo in 1097, while on his journey to the East to serve in the crusading armies. Consult E. A. Freeman, *Norman Conquest*, vol. iv (Oxford, 1871).

ODO, or **EUDES**, of Paris (c.857–898). King of France from 888 to 898. He was the son of Robert the Strong, progenitor of the Capetians. Odo was Duke of France, Count of Paris, and the defender of the city during the siege by the Northmen in 886. His father's popularity and his own valor caused him to be chosen King of the West Franks in 888, after the deposition of Charles the Fat. His reign was troubled by rebellions on the part of the supporters of Charles the Simple, the Carolingian heir. Odo kept the Kingdom, but before his death, Jan. 1, 898, recommended his followers to recognize Charles as his successor. Consult Edouard Favre, *Eudes, comte de Paris et roi de France* (Paris, 1893), and Ernest Lavisse, *Histoire de France*, vol. ii, part i (ib., 1903).

O'DOA'CER, or **O'DOVA'CER** (c.435–493). Ruler of Italy from 476 to 493. He was the son of Ædico, a noble of the race of the Rugii or of the Scyri, and saw his first military service probably in the army of Orestes, father of the young Romulus Augustulus, last Emperor of the West. Odoacer perceived the weakness of the new ruler and resolved to profit by it. He had little difficulty in persuading the barbarian soldiery that Italy belonged to them, and in their name demanded of Orestes the third part of the land as the reward of their help. Orestes refused, and Odoacer at the head of his Scyri, Heruli, Rugii, and Turcilingi marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdicated and withdrew into obscurity. Odoacer showed himself to be wise, moderate, and politic. He took the title of King only and caused the Senate to dispatch to Constantinople a flattering letter, in which it declared one Emperor to be enough for both East and West, renounced its right of appointing the emperors, expressed its confidence in the civil and military talents of Odoacer, and begged Zeno to confer upon him the administration of Italy. After some hesitation the Byzantine Emperor yielded to the entreaties of the Senate, and Odoacer received the title of Patricius. This was formerly taken as the date for the fall of the Western Empire.

Odoacer fixed his residence at Ravenna. According to his promise he divided among his companions the third part of the land of Italy—a measure far less unjust than at first sight may seem, for the peninsula was then almost depopulated, and many domains were lying waste. He maintained peace throughout the peninsula and conquered Dalmatia. In matters of religion, though an Arian himself, he acted with great impartiality; nevertheless he was intensely hated by the native Italians. The success of Odoacer excited the jealousy and alarm of Zeno, the Emperor of the East, who encouraged the Ostrogoth King, Theodoric (q.v.), to undertake an expedition against Italy, hoping at the same time to get rid of the Goths, who were a menace to Constantinople. The first battle was fought on the banks of the Isontius (the modern Isonzo) in 489. Odoacer was beaten and retreated. During his retreat he hazarded another battle at Verona and was again beaten. He now hastened to Rome to rouse the inhabitants, but the gates of the city were closed against him. Returning northward to his capital, Ravenna, he reassembled the wrecks of his army and in 490 once more marched against the Ostrogoths, whose advance guard he defeated and pursued to the walls of Pavia. Another great battle now took place on the banks of the Adda, when Odoacer was vanquished for the third time. He now shut himself up in Ravenna, where Theodoric besieged him for three years. Odoacer then capitulated, on condition that the Kingdom of Italy should be shared between him and Theodoric. This agreement was solemnly sworn to by both parties March 5, 493, but on March 15 Odoacer, invited to a banquet by Theodoric, was killed by the Gothic King's own hand. Consult: Thomas Hodgkin, *Italy and her Invaders*, vol. iii (Oxford, 1885); *Cambridge Medieval History*, vol. i (New York, 1911); Edward Gibbon, *Decline and Fall of the Roman Empire*, vol. iv, edited by J. B. Bury (London, 1912).

ODOM'ETER (from Gk. *ὁδός*, *hodos*, road + *μέτρον*, *metron*, measure). An instrument used in connection with a vehicle or other wheel for measuring lengths of road or other distances. The odometer consists of a series of gear wheels so arranged that the first and smallest wheel revolves either once or some definite fraction of a revolution for every revolution of the vehicle wheel to which it is attached. This is usually accomplished either by a star wheel with which a projection on or near the hub of the vehicle comes in contact, or some similar device. As the circumference of the wheel can readily be measured it is, of course, possible to arrange the gear wheels so that there will be recorded finally and shown by dials or other indicators the distance in feet, yards, miles, or kilometers. The odometer, which was at one time used but rarely except by road surveyors, especially in preparing county maps, is extensively employed with bicycles and motor vehicles, and in this form is known as a cyclometer or speedometer, as with an automobile it indicates in addition the rate of travel.

ODONAIS, Jean Godin des. See Godin des Odonais, Jean.

OD'ONA'TA (Neo-Lat., from *ὀδούς*, *odous*, tooth). An order of insects comprising the dragon flies. See Dragon Fly.

O'DON'NELL, Henry Joseph (1769–1834). A Spanish general, descended from a well-known Irish family. He commanded (1810) the armies in Cataluña against the French. His brilliant services won him the rank of general and field marshal and the title Count of La Bisbal. Despite his vacillating political leanings, his support of Fernando VII was on the whole constant. In 1823, when the French troops were approaching Madrid, he lost all his honors and was sent into exile.

O'DONNELL, Leopold, Duke of Tetuán (1809–67). A marshal of Spain, son of Henry Joseph O'Donnell. He was born at Santa Cruz, Teneriffe, entered the army when young, and embraced the cause of Isabella (q.v.) against Don Carlos, whose armies he fought bravely under Espartero, gaining the title of Count of Lucena. In 1840 he sided with María Christina, the Queen mother, went with her to France, and stirred up a number of unsuccessful revolts against Espartero, his old chief. In 1843 his intrigues were more fortunate, Espartero fell, and O'Donnell went to Cuba as Governor-General. Returning rich in 1848, he plotted against the ministers Bravo-Murillo and Narváez. In 1854 he headed a military insurrection; defeated and driven into Andalusia, he suddenly turned Liberal, issued a radical manifesto, and gave his rising the aspect of a revolution. Espartero joined him, and the two men assumed the powers of government. Then by a coup O'Donnell ousted Espartero, July, 1856, but in three months was himself ousted by Narváez. He resumed office in 1858 and while Prime Minister and commander in chief led a successful expedition against the Moors (1859) and was made Duke of Tetuán. He resigned in 1863, but was recalled in 1865 and remained Prime Minister till 1866. Consult, for a life of O'Donnell, Manuel Ibo Alfaro, *La corona de laurel* (Madrid, 1860).

O'DONOGHUE, ō-dŏn'ō-hụ, David James (1866–). An Irish biographer and editor, born in Chelsea, London. He was educated in a Roman Catholic school and began his journalistic work by writing for the Dublin papers upon subjects relating to Irish music, art, and literature. A founder of the Irish Literary Society in London, he was also vice president of the National Literary Society, Dublin, and the compiler of a biographical dictionary called *The Poets of Ireland* (1891–93; rev. ed., 1912). He published also: *Irish Poetry of the Nineteenth Century* (1894); *Humor of Ireland* (1894; new ed., 1911); *List of 1300 Irish Artists* (1894), an edition of J. F. Lalor's writings (1895); an edition of William Carleton's *Traits and Stories of the Irish Peasantry* (4 vols., 1896–97); *Bibliographical Catalogue of Collections of Irish Music* (1899); *Geographical Distribution of Irish Ability* (1906). He edited the works of Samuel Lover (6 vols., 1898–99) and the prose works (1903) and poems (1904) of James Clarence Mangan. Among his biographies are those of *William Carleton* (1896), *Richard Pockrich* (1899), and *Robert Emmet* (1902).

O'DONOJÚ, ō-dŏ'nō-hōō', Juan (c.1755–1821). A Spanish soldier. Entering the army, he rose to the rank of lieutenant colonel and served as captain general of Andalusia. In 1821 he was appointed captain general and *jefe superior politico* of New Spain. Finding that Itúrbide had practically conquered the viceroyalty, O'Donojú signed the Treaty of Córdoba (August 24), which provided for an independent empire in Mexico. He was received in Mexico City on September 15 and a few days later surrendered the city to the Army of the Three Guarantees of Itúrbide. A provisional junta was formed, which named a regency of five members, including Itúrbide and O'Donojú (September 28). He died a few days later.

O'DON'OVAN, Jeremiah. See Rossa, O'Donovan.

O'DONOVAN, John (1809–61). An Irish historian, archæologist, and Gaelic scholar. He was born at Attateemore, County Kilkenny, and was educated in Dublin. In 1826 he obtained a post in the Irish Record Office and in 1829 one in the historical department of the Ordnance Survey, becoming an authority on Irish topography. To the first volume of publications of the Irish Archæological Society O'Donovan contributed a map of ancient Ireland (1841). Thereafter he was the editor of the publications of this society and wrote prolifically on Irish history and antiquities. He was called to the Irish bar in 1847, having entered at Gray's Inn three years before. Later he was appointed professor of the Irish language in Queen's College, Belfast. O'Donovan's chief work was an edition (finished 1851) of the so-called *Annals of the Four Masters*, a compilation made in the seventeenth century by Michael O'Clery and a company of Irish Franciscans. With Eugene O'Curry (q.v.) he helped compile the ancient laws of Ireland. He also made extensive manuscript collections for an edition of the *Seanchus Mor*, but did not live to prepare them for publication. In 1847 he published a *Grammar of the Irish Language*. Consult: Gilbert, *Memoir* (London, 1862); Carrigan, *History and Antiquities of the Diocese of Ossory* (Dublin, 1905); Douglas Hyde, *Literary History of Ireland* (London, 1906).

O'DONOVAN, William Rudolf (1844–). An American sculptor. He was born in Preston Co., Va., and was self-taught in art. After serving in the Civil War, he opened a studio in New York and executed many military statues and bas-reliefs, but he is perhaps best known for his portrait busts, which are usually spirited and well characterized. Among the most important are those of Winslow Homer, Thomas Eakins, Edmund Clarence Stedman, Walt Whitman, Gen. Joseph Wheeler, and, more recently, those of Generals Daniel E. Sickles, James Grant Wilson, and Stryker, the latter for the Trenton battle monument. His military statues and bas-reliefs include three statues of Washington—for Carácas, Venezuela, the Peace Monument of Newburgh, N. Y., and the Trenton battle monument; the equestrian statues of Lincoln and Grant on the Soldiers and Sailors Arch, Prospect Park, Brooklyn; a statue to the captors of Major André, Tarrytown, N. Y.; and statues of General Morgan for the Saratoga battle monument and of General Wagner in Charleston, S. C. O'Donovan became an associate of the National Academy (1878) and a member of the Society of American Sculptors and of the Architectural League. He made New York City his residence.

ODON'TOCE'TI. See Cetacea.

ODONTOLCÆ, ŏ'dŏn-tŏl'sē. See Bird, Fossil.

ODON'TOLITE. See Turquoise.

O'DONTOL'OGY. See Dentistry; Teeth.

O'DONTOR'NITHES. Primitive birds which had teeth in the jaws (bill). See Bird, Fossil.

ODORLESS PHOSPHATE. See Thomas Slag.

ODOVA'CER. See Odoacer.

O'DWY'ER, Joseph (1841–98). An American physician, specialist in the diseases of children. He was born in Summit Co., Ohio, and graduated from McGill University, Montreal, and in 1866 from the College of Physicians and Surgeons, New York City. He established himself in New York, becoming connected with several hospitals. In 1885 he improved intubation of the larynx, introduced by Eugène Bouchut (1818–91). (See Tracheotomy.) For three years he labored on the problem until, in 1888, he had perfected the method through which he became one of the greatest promoters of children's welfare. His results were published as "Analysis of Fifty Cases of Croup Treated by Intubation of the Larynx" and "Intubation in Chronic Henosis of the Larynx," both in the *New York Medical Journal* (New York, 1888). He was at one time president of the American Pediatric Society.

ODYNIEC, ŏ-dĕ'nyĕts, Antoni Edward (1804–85). A Polish poet and critic, best known for his close relations with Mickiewicz. He was born in Lithuania, studied at Vilna, and, settling at Warsaw, became editor of *Melitele,* a periodical which reflected the aims of the young Romanticists of the time. He had already written translations from the German, especially Bürger, and the two volumes of Romantic verse entitled *Poezye* (1825). After years in Dresden and Leipzig he returned to Vilna in 1837 and till 1859 was editor of *Kurjer Wileński*, an official journal. His dramas include: *Felicyta* (1849), dealing with the early Christian martyrs; *Barbara Radziwiłówna* (1858), an historic piece of the time of Sigismund Augustus; *Jerzy Lubomirski* (1861). *Listy z podróży* (1875–78) tells of his travels with Mickiewicz in the years 1829–30. Consult Bratranek, *Zwei Polen in Weimar* (Vienna, 1870).

ODYS'SEUS. See Ulysses.

OD'YSSEY. See Homer.

Œ'COLAMPA'DIUS, Johannes (1482–1531). One of the coadjutors of Zwingli in the Swiss Reformation. The name Œcolampadius is a Græcized form, his real name being variously given as Heussgen, Hüssgen, Hausch, and Huschke; at any rate it was not Hausschein, as has been inferred from the meaning of Œcolampadius. He was born at Weinsberg, Württemberg, and first studied at Heilbronn, then at Heidelberg, where he took his B.A. and M.A. (1503). He studied law at Bologna and theology at Heidelberg, went to Tübingen (1512), and later studied Greek at Stuttgart under Reuchlin and Hebrew under the Spanish physician Matthew Adrian at Heidelberg. In 1516 he began preaching at Basel, where he formed the acquaintance of Erasmus, who highly appreciated his classical attainments and secured his assistance in his edition of the New Testament. In 1518 he was preaching at Augsburg and in 1520 entered the Brigittine convent at Altmünster, near Basel. But Luther's publications exercised so great an influence on him that he left the convent in 1522 and became chaplain to Franz von Sickingen. After the latter's death he returned to Basel in November, 1522, and commenced his career as a reformer, preaching and teaching theology. In the controversy concerning the Lord's Supper, he gradually adopted more and more the view of Zwingli that the sacrament was a memorial only. To his treatise on the subject (1525) the Swabian ministers replied in the *Syngramma Suevicum*. In 1529 he disputed with Luther at Marburg. Œcolampadius died at Basel, Nov. 24, 1531. There is no collected edition of his writings. Consult the *Life* by J. J. Herzog (Basel, 1843) and that by K. R. Hagenbach (Elberfeld, 1859); also Williston Walker, in *The Reformation* (New York, 1900), and *Cambridge Modern History*, vol. ii (ib., 1904).

ŒCOL'OGY. See Ecology.

ŒCUMENIUS, ĕk'ū-mē'nĭ-ŭs. A theological author of the tenth century. He was for some time Bishop of Tricca, in Thessalia, and is supposed to have written the following Greek commentaries to the New Testament: *'Εξηγήσεις εἰς τὰς Παύλου 'Επιστολὰς πάσας* (Commentaries on all the Epistles of St. Paul); *'Εξηγήσεις εἰς τὰς Πράξεις τῶν 'Αποστόλων* (Commentaries on the Acts of the Apostles); *'Εξηγήσεις εἰς τὰς ἑπτὰ καθολικὰς λεγομένας 'Επιστολάς* (Commentaries on the Seven Epistles termed Catholic); and *Commentaria in Sacrosancta Quatuor Christi Evangelia*, published by Hentenius in 1641, but now generally ascribed to Euthymius Zygadenus. The Greek text of this last commentary was published by C. F. Matthaei (Leipzig, 1792), and a complete edition of all Œcumenius' writings was published, in both Latin and Greek, in Paris in 1631.

ŒDE'MA (Neo-Lat., from Gk. *οἴδημα, oidēma,* swelling, from *οἰδεῖν oidein,* to swell, from *οἶδος, oidos,* swelling). The term applied in medicine to the swelling occasioned by the effusion or infiltration of serum into cellular or areolar structures. The subcutaneous cellular tissue is the most common, but is not the only seat of this affection. It is occasionally observed in the submucous and subserous cellular tissue and in that of the parenchymatous viscera, and in some of these cases it gives rise to symptoms which admit of easy recognition during life. Thus, œdema of the glottis (see Larynx, Diseases of) and œdema of the lungs constitute well-marked and serious forms of disease; while œdema of the brain, though not easily recognized during life, is not uncommonly met with in the post-mortem examination of insane patients. A general œdema is called *anasarca*.

Œdema may be either passive or active, the former being by far the more common. *Passive,* or *simple, œdema* arises from impeded venous circulation (as from obstruction or obliteration of one or more veins; from varicose veins; from standing continuously for long periods, till the force of the circulation is partly overcome by the physical action of gravitation; from deficiency in the action of the adjacent muscles, which in health materially aids the venous circulation, etc.); from too weak action of the heart (as in dilatation or certain forms of valvular diseases of that organ); or from an impoverished or toxic state of the blood (as in chlorosis, scurvy, Bright's disease, etc.). The cause of œdema may often be inferred from the seat of the swelling; e.g., œdema of the face, usually commencing with the eyelids, is commonly caused by obstruction to the circulation through the left side of the heart, or by the diseased state of the blood in Bright's disease; and œdema of the lower extremities most commonly arises from obstruction in the right side of the heart, unless it can be traced to the pressure of the gravid uterus, or of accumulated fæces in the colon, or to some other local cause.

Active, or *plastic*, *œdema* is associated with inflammation of the cellular tissue and is marked in erysipelas. It is firmer to the touch, and pressure with the finger produces less pitting than in the passive form.

Angioneurotic œdema is an affection of neurotic origin characterized by transient, circumscribed swellings in different parts of the body, which come and go suddenly. They may appear on the face and involve a single eyelid or the nose. The larynx may become swollen and cause death from suffocation.

Malignant œdema is due to a specific infection, the bacillus of which is found in earth. It is rapidly fatal. See ANTHRAX.

From the preceding remarks it will be seen that œdema is not a disease but a symptom, and often a symptom indicating great danger to life. The means of removing it must be directed to the morbid condition or cause of which it is a symptom. For an account of the clinical and experimental aspects of œdema, consult M. H. Fischer, *Œdema and Nephritis: A Critical, Experimental, and Clinical Study* (New York, 1915). See DROPSY.

OEDENBURG, ẽ'den-bụrk. See ODENBURG.

ŒD'IPUS (Lat., from Gk. Οἰδίπους, *Oidipous*, Οἰδιπόδης, *Oidipodēs;* according to the popular etymology from *οἰδεῖν*, *oidein*, to swell + *πούς*, *pous*, foot. Some, however, connect the name with *οἶδα*, *oida*, I know, and, disregarding *-πούς*, make Œdipus mean the Wise, in allusion to his skill in solving the riddle). The hero of one of the most famous Theban legends. The story was certainly told in the early epics, one of which bore the title *Œdipodea*, and it is briefly indicated in the *Odyssey*, but for us it is known chiefly through the plays of the Athenian tragedians, especially Sophocles. The earlier versions, which seem to have varied in many and not unimportant details, are all lost, and though many hints can be obtained by careful analysis of later chroniclers and commentators, any complete reconstruction of the lost poems is in the highest degree conjectural. After passing through the hands of the dramatists the story assumed the following form: Laius, son of Labdacus, King of Thebes, was warned by Apollo's oracle at Delphi that he was to die at the hands of his son. In spite of this warning Laius became by his wife Jocasta the father of a boy. When the child was born he fastened its ankles with a pin (whence the name "swell foot"; some, however, think the story came from a wrong explanation of the name; see above) and gave it to a faithful herdsman to expose on Mount Cithæron. Ignorant of the oracle, the man in pity gave the child to the shepherd of Polybus, King of Corinth, and that ruler, who was childless, reared him as his own son. The young man, Œdipus, never doubted his Corinthian origin till the taunt of a drunken companion roused his suspicions, and, unable to obtain satisfaction from his supposed parents, he sought the oracle at Delphi, which did not answer his question, but warned him that he was doomed to slay his father and wed his mother. Horrified, Œdipus fled away from Corinth, and shortly after, at a narrow place in the road, met Laius with his servants. They endeavored to force him from the road, and in the quarrel he slew them all, as he supposed. Pursuing his journey, he found Thebes harassed by the Sphinx (q.v.), who propounded a riddle to every passer-by and devoured all who failed to solve it. Creon, the brother of Jocasta, who had become King on the death of Laius, had offered the hand of his sister and the kingdom to him who, by solving the riddle, should free the city from the monster. Œdipus answered the riddle and thus slew the Sphinx. He then married Jocasta, his mother, and became King of Thebes. At first he prospered greatly, and four children were born to him, two sons, Eteocles and Polynices (q.v.), and two daughters, Antigone (q.v.) and Ismene. At length a terrible pestilence visited Thebes, and the oracle declared that the murderer of Laius must be expelled from the country. Œdipus began the search, and by degrees the truth became known. Jocasta hanged herself and Œdipus put out his eyes. The later fate of the King was told in varied form. His sons by their deeds brought upon themselves his curse, and ultimately fell by each other's hand. Œdipus himself was driven from Thebes and, attended by his faithful daughter Antigone, wandered over the earth, till he reached the grove of the Eumenides (q.v.), at Colonus, near Athens. Chastened by his sufferings, he was received by these dread goddesses and conducted, some said, without death to the other world.

For the legend in its varied forms, consult the introductions in Sir R. C. Jebb's editions of the *Œdipus Tyrannus*, *Œdipus Coloneus*, and *Antigone* of Sophocles (Cambridge, 1891–1900); also U. von Wilamowitz-Möllendorf, *Griechische Tragödien*, vol. i (Berlin, 1899), and Karl Robert, *Oidipus: Geschichte eines poetischen Stoffs im griechischen Altertum* (2 vols., ib., 1915). For the epic forms, see Erich Bethe, *Thebanische Heldenlieder* (Leipzig, 1891). The other extant Greek plays which touch upon the general subject are Æschylus, *Seven against Thebes*, and Euripides, *Phœnissæ*. It is treated, too, in the *Œdipus* and the *Phœnissæ* of the Roman poet Seneca. Consult also the article "Oedipous," by A. Höfer, in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (Leipzig, 1897–1909).

ŒDIPUS COLO'NEUS (Lat., from Gk. Οἰδίπους Κολώνειος, *Oidipous Kolōneios*, Œdipus of Colonus). A tragedy by Sophocles, produced in 401 B.C. after the author's death. The action takes place in the grove of the Eumenides at Colonus, to which the blind Œdipus is conducted by his daughter Antigone, and where he is to die.

ŒDIPUS TYRAN'NUS (Lat., from Gk. Οἰδίπους τύραννος, *Oidipous tyrannos*, Œdipus the King). The greatest drama of Sophocles and the most representative of Greek tragedies. The scene is Thebes, which has been visited by a pestilence and can be cleansed only by the punishment of the murderer of Laius, on whom Œdipus invokes curses. The plot consists in the gradual bringing home to Œdipus that he is the unwilling murderer of his father and the husband of his own mother. In the horror of the enlightenment Jocasta kills herself and Œdipus in frenzy blinds himself and begs Creon to banish him.

Œ'DOGO'NIUM. One of the best known and most frequently studied of the green algæ (Chlorophyceæ, q.v.). They are simple anchored filaments in which the female organ (oögonium) is a cell that becomes much enlarged and very conspicuous.

OEHLENSCHLÄGER, ẽ'len-shlā'gẽr, Adam Gottlob (1779–1850). A Danish poet and dramatist, born of Danish and German ancestry at Vesterbro, near Copenhagen. He was irregularly educated, was destined first for trade, then for the university, and then went on the stage. After failure as an actor he studied law, but after 1802 devoted himself to literature. In the symbolic poem *Guldhornene* he declared his new faith, destroyed older verses then in the printer's hands, and composed in haste new ones in their place that made him undisputed head of the new Romanticists. From 1805 to 1809 he traveled on a government stipend, visiting Goethe, Madame de Staël, and other noted writers. In 1810 he was made professor of æsthetics at Copenhagen, but did not long retain this position. In 1829 he was crowned by Tegnér as King of the Singers of the North. He was similarly honored at the royal palace in Copenhagen in November, 1849, and his funeral, two months later, was made a national occasion. Oehlenschläger's importance lies in drama, beginning with *Sanct Hans Aaften-Spil* (1803), followed by a series of national tragedies, *Haakon Jarl* (1807; Eng. trans., 1875), *Baldur hin Gode* (1808), *Karl den Store, Palnatoke* (1809), *Axel og Valborg* (1810), *Væringerne i Miklagard*, and 13 others, together with 5 of a more general character, of which the first, *Correggio* (originally written in German, 1809; Danish, 1811; Eng. trans., 1846, 1854), is typical. Oehlenschläger's dramas, like those of other Romanticists, show epic and lyric rather than dramatic qualities. They are genuinely national, most of them rooted in the popular sagas, and they show unrivaled command of language. Through them he gave the *Eddas* new life. By his youthful *Poems* (1805) he revealed unexpected lyric possibilities in the Danish language. Of these poems perhaps the dramatic fairy tale *Aladdin* is most significant. His later lyric and epic work is not of great value, except *Nordens Guder* (*Gods of the North*, 1819). Oehlenschläger's *Works* are in 33 volumes (Copenhagen, 1857–62), of which a new edition was issued by Boysen in 15 volumes, containing a biography by Andersen (1897–1900). *Axel and Valborg: Historical Tragedy*, translated by F. S. Kolla, was published in 1906.

Bibliography. A. G. Oehlenschläger, *Meine Lebens-erinnerungen* (4 vols., Leipzig, 1850); K. A. E. Arentzen, *Baggesen og O.* (8 vols., Copenhagen, 1870–78), and his biography of Oehlenschläger (ib., 1879); the biography by Rasmus Nielsen (ib., 1879); Wilhelm Andersen, *Adam Oehlenschläger, et Livs Poesi* (3 vols., ib., 1899–1900); Georg Brandes, *Gesammelte Schriften*, vol. ii (Munich, 1902); Albert Sergel, *Adam Oehlenschläger in seinen persönlichen Beziehungen zu Goethe, Tieck und Hebbel, nebst einer Oehlenschläger-bibliographie* (Rostock, 1907).

OEHLER, ẽ'lẽr, Gustav Friedrich (1812–72). A German theologian. He was born at Ebingen, Württemberg, and studied at Tübingen. In 1834 he became teacher in the Missionary Institution of Basel, which he left in 1837 to study Oriental languages at Berlin. The same year he went to Tübingen as repetent. From 1840 till a call to Breslau in 1845 he was professor in the seminary at Schönthal. He opposed the union of the Lutheran and Reformed churches, and while declaring in favor of confessional Lutheranism, he held aloof from the old Lutheran party. In 1852 he returned to Tübingen as director of the seminary and professor of Old Testament theology in the university. Here he produced his principal work, *Theologie des Alten Testaments* (2 vols., 1873–74; Eng. trans., Edinburgh, 1874–75; New York, 1883). Identified with the conservative school, Oehler was one of the foremost Old Testament scholars of his time. He contributed many articles to Herzog's *Realencyklopädie* and wrote a *Lehrbuch der Symbolik* (1876, edited by Johann Delitzsch). Consult Josef Knapp, *Ein Lebensbild von Oehler* (Tübingen, 1876).

ŒIL-DE-BŒUF, ẽ'y'-de-bẽf (Fr., ox eye). A term applied in architecture to those small round or oval openings in the frieze or roof of large buildings which serve to give light to spaces otherwise dark. The most famous is in the anteroom of the royal chamber at Versailles, which gave name to the apartment.

OELAND, ẽ'länt. An island in the Baltic Sea. See Oland.

OELS, ẽls. A city of Prussia. See Ols.

OELWEIN, ōl'wīn. A city in Fayette Co., Iowa, 53 miles north of Cedar Rapids, on the Rock Island System and at the junction of four branches of the Chicago Great Western Railroad (Map: Iowa, F 2). The latter maintains large repair shops here, and there is also a foundry. The government, under a charter of 1888, revised in 1897, is vested in a mayor, elected every two years, and a unicameral council. The water works are owned and operated by the municipality. Settled in 1875, Oelwein was incorporated first in 1888. Pop., 1900, 5142; 1910, 6028.

Œ'NANTHYL'IC ACID (from *œnanthyl*, from Lat. *œnanthe*, from Gk. *οἰνάνθη*, *oinanthē*, first shoot of the vine, vine, from *οἶνος*, *oinos*, wine + *ἄνθος*, *anthos*, flower), Normal, $CH_3(CH_2)_5COOH$. One of the volatile fatty acids. It was formerly believed to be the acid component of an ester to which the characteristic odor of wine is due; it has, however, been shown that that odor is really due to a mixture of esters of the acids called capric and caprylic. Œnanthylic acid may be prepared best by the oxidation of œnanthol, $C_6H_{13}CHO$, a product of the distillation of castor oil. At ordinary temperatures œnanthylic acid forms an oily liquid that boils at about 222° C. (431.6° F.) under a pressure of 743 millimeters. At low temperatures it solidifies, the solid melting at —10.5° C. (13.1° F.).

ŒNEUS, ẽ'nūs (Lat., from Gk. *Οἰνεύς*, *Oineus*). King of Calydon, the father, by Althæa, of Meleager and Deianira and, by Melanippe, of Tydeus. The famous Calydonian Boar (q.v.), afterward slain by Meleager, was sent to devastate his territory as a punishment for his omission of Artemis in sacrificing to the gods upon reaping the produce of his fields. Œneus was dethroned by the sons of his brother Agrius, and was rescued by Diomedes, who took him to Argolis, where he was afterward slain by the two surviving sons of Agrius. The city of Œnoë was built upon the site of his burial place. He was the first to receive the vine from Bacchus, who taught him its cultivation, and the juice of the grape was from his name called *οἶνος*, wine.

Œ'NOMA'US (Lat., from Gk. *Οἰνόμαος*, *Oinomaos*). The son of Ares and Harpinna and King of Pisa in Elis. Having been warned that if his daughter Hippodamia married, he would perish by the hand of her husband, he made it a condition that all her suitors should strive with him in a chariot race from Pisa to the altar of Poseidon on the Isthmus of Corinth, and if conquered should be slain. Pelops, son of Tantalus, on entering the contest, bribed Myrtilus, the charioteer of Œnomaus, to disable the latter's chariot, and with a chariot and horses given him by Poseidon was victorious in the race. Œnomaus was killed, and when dying cursed Myrtilus. To the latter Pelops refused the promised reward and cast him down from Cape Geræstus. The curse uttered by the dying Myrtilus on Pelops brought in its train the misfortunes which pursued the latter's family. See Hippodamia; Pelops.

ŒNONE, ē-nō′nē (Lat., from Gk. *Οἰνώνη*, *Oinōnē*). A nymph, who became the wife of Paris (q.v.) while he was still a shepherd on Mount Ida. She warned him of the results of his journey to Greece, and told him that she only could cure him if he should be wounded. When Paris was wounded by the arrow of Philoctetes he sought the aid of Œnone, who, angered by his desertion, declined to assist him. After Paris's return to Troy and his death there Œnone repented and in grief at coming too late cast herself on his funeral pile. The story is told in Tennyson's poem *Œnone* (1832). For Œnone's desolation after Paris left her for Helen, consult Ovid, *Heroides*, v.

ŒNOPIDES, ē-nŏp′ĭ-dēz (Lat., from Gk. *Οἰνοπίδης*, *Oinopidēs*). A Greek astronomer, born in Chios, possibly a contemporary of Anaxagoras. He learned astronomy in Egypt and there, no doubt, got his knowledge of the obliquity of the ecliptic, the discovery of which is often ascribed to him. Ælian attributes to Œnopides the 59-year cycle intended to harmonize the lunar and solar years and the determination of the length of the solar year as 365[illegible] days.

ŒNOTH′ERA (Neo-Lat., from Gk. *οἰνοθήρας*, *oinothēras*, plant whose root smells like wine, from *οἶνος*, *oinos*, wine, + *θηρᾶν*, *thēran*, to seek). A genus of plants of the family Onagraceæ, having four petals and eight stamens, the calyx limb four-cleft, the segments reflexed, the capsule four-valved, with many naked seeds. The evening primrose (*Œnothera biennis*), a beautiful plant, native of the United States, has been known in Europe since 1614, and is now naturalized in many parts of Europe, on the banks of rivers, in thickets, on sandy grounds, etc. The plant is often cultivated for its fragrant flowers, which expand in the evening and at the summit of a leafy spike in the second year. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy, and tender; it is sometimes eaten in salads or in soups and as a boiled vegetable. Several other species of *Œnothera*, natives of North America, are cultivated in gardens. The Œnotheras have lately become of interest to plant breeders on account of the investigations of De Vries in Holland, where a number of new forms have been found that he calls mutants. Some of these appear quite distinct and they have been described by him as species. De Vries's mutation theory is largely based on the behavior of these plants. See Mutation, and Plate of Flowers.

OERSTED. See Orsted.

OERTEL, Abraham. See Ortelius, Abraham.

OERTEL, ĕr′tel, Max Joseph (1835–97). A German physician, specialist in diseases of the lungs and heart. He was born at Dillingen, studied at Munich, and in 1867 became docent of laryngology there, from which post he was promoted to a professorship in 1876. Oertel discovered the bacillus of diphtheria in 1868, but is better known for his system of hill climbing as a cure for faulty respiration or circulation. A device for examining the larynx, the laryngostroboscope, is one of his inventions. His best-known work is "Respiratorische Therapie" and "Therapie der Kreislaufstörungen," in *Handbuch der allgemeinen Therapie* (1883; 4th ed., 1891). He also wrote: *Ueber den laryngologischen Unterricht* (1878); *Ueber Terrainkurorte zur Behandlung von Kranken mit Kreislaufstörungen* (1886; 2d ed., 1904); *Pathogenese der epidemischen Diphtherie* (1887); *Das Laryngostroboskop und seine Verwendung in der Physik, Physiologie und Medizin* (1895).

OESEL, ē′zel. A Russian island. See Osel.

OESER, ē′zĕr, Adam Friedrich (1717–99). A German painter, etcher, and sculptor, born at Pressburg, Hungary. He was a pupil of the Vienna Academy in painting and of Raphael Donner in sculpture. In 1739 he went to Dresden, painted portraits, scenes for the Royal Opera, and mural paintings in Castle Hubertsburg (1749), and removed to Leipzig in 1759. Appointed director of the newly founded Academy there in 1764, he zealously opposed mannerism in art and was a stout champion of Winckelmann's advocacy of reform on antique lines. His chief importance is as a teacher; among his numerous pupils was Goethe, with whom he kept up friendly relations afterward at Weimar. Besides a number of decorative works, mostly ceilings, he painted mythological and religious canvases and portraits, among the best being: "The Artist's Children" (1766, Dresden Gallery), "Marriage at Cana" (1777) and four others in the Leipzig Museum, and "The Painter's Studio" (Weimar Museum). His best effort in sculpture is the monument of Elector Frederick Augustus (1780) on the Königsplatz in Leipzig. For his biography consult Dürr (Leipzig, 1879).

ŒSOPH′AGUS (Neo-Lat., from Gk. *οἰσοφάγος*, *oisophagos*, gullet, from *οἴσειν*, *oisein*, to be about to carry + *φαγεῖν*, *phagein*, to eat), or Gullet. A membranous canal extending from the pharynx to the stomach and thus forming a part of the alimentary canal. It commences at the lower border of the cricoid cartilage of the larynx, descends in a nearly vertical direction along the front of the spine, passes through an opening in the diaphragm, and thus enters the abdomen, and terminates in the cardiac orifice of the stomach opposite the eleventh dorsal vertebra, with a length of about 10 inches. It has three coats, viz., an external or muscular coat (consisting of two strata of fibres of considerable thickness—an external, longitudinal, and an internal, circular), an internal or mucous coat, which is covered with a thick layer of squamous epithelium, and an intermediate cellular coat, uniting the muscular and mucous coats. In this tissue are a large number of œsophageal glands, which open upon the surface by a long excretory duct and are most numerous round the cardiac orifice, where they form a complete ring.

The œsophagus is liable to a considerable number of morbid changes, none of which are, however, of very common occurrence.

The most prominent symptom of *inflammation of the œsophagus* is pain between the shoulders or behind the trachea or sternum, augmented in deglutition, which is difficult or impossible. The affection is rare, arising usually from contact with hot or irritating substances or corrosive poisons.

Spasm of the œsophagus, a morbid muscular contraction of the tube, producing difficulty of swallowing, is more common. The spasm generally comes on during an attempt to swallow food or liquid. A predisposition generally is present in hysteria, hypochondriasis, and especially in hydrophobia. An attack may consist of a single paroxysm, lasting only a few hours, or it may persist for months or years. The treatment must be directed to the establishment of the general health. A temporary cure often follows the passage of a bougie.

Paralysis of the œsophagus is present in certain forms of organic disease of the brain or spinal cord which are seldom amenable to treatment.

Permanent or organic stricture of the œsophagus may arise from inflammatory thickening and induration of its coats. The most common seat of this affection is at its upper part. The symptoms are persistent and gradually increasing difficulty of swallowing, occasionally aggravated by spasm; and a bougie, when passed, always meets with resistance at the same spot. When the contraction is due to inflammatory thickening it may arise from the abuse of alcoholic drinks or from swallowing boiling or corrosive fluids. If unrelieved the disease must prove fatal, either by ulceration of the tube around the seat of the stricture or by starvation. When the affection is due to chronic inflammatory thickening some advantage may be derived from dilatation by means of the œsophageal bougie. If it is dependent upon malignant disease, and the tissues have become softened by the infiltration of the morbid deposit, the bougie must be directed with the greatest care through the stricture, as a false passage may be easily made into important adjacent cavities. Pouches, or diverticula, often form above a stricture, and masses of food lodge there, giving the impression that it has passed normally into the stomach.

Foreign bodies not very infrequently pass into the œsophagus and become impacted there, giving rise to a sense of choking and fits of suffocative cough, especially when they are seated in its upper part. If the body is small and sharp (a fish bone, e.g.) it may often be got rid of by making the patient swallow a large mouthful of bread; if it is large and soft (such as too large a mouthful of meat) it may generally be pushed down into the stomach with the probang; while large hard bodies (such as pieces of bone) may be extracted through a suitable illuminated metal tube (œsophagoscope or bronchoscope) by means of a grasping forceps. If the offending body can neither be brought up nor pushed down, it must be extracted by *œsophagotomy*, an operation which can only be performed when the impacted body is not very low down.

Rupture of the œsophagus has occurred from violent vomiting during a state of intoxication and following a heavy meal. It is a fatal but exceedingly rare accident. Consult Hugo Starck, *Lehrbuch der Oesophagoskopie* (Würzburg, 1914).

ŒSOPHAGUS, COMPARATIVE ANATOMY OF THE. In length, structure, and appearance in cross section there is the greatest variety in different groups of animals, and, indeed, an œsophagus may be entirely wanting, as, e.g., in *Hydra*, where the mouth opens directly into the digestive cavity. The cœlenterates are divided into two great classes according to the origin of the œsophagus; in one, the Hydrozoa, the œsophagus, when present, has arisen from the endoderm, while in the other, the Scyphozoa, it has been formed by an invagination of the ectoderm. In all animals above cœlenterates, where a mouth is present there is more or less of an œsophagus, but its appearance varies widely with the form of the body. Long-necked animals have long œsophaguses as a rule, while in animals with little or no neck the œsophagus may be very short. In mammals its upper part is closely associated with the pharynx, and its muscles are striated (voluntary), but lower down the muscles are unstriated (involuntary). In birds the œsophagus is very extensible and capable of holding a considerable amount of food in storage, and this ability is greatly increased by the development of a special pouch or pair of pouches on the ventral side of its lower part, known as the crop. This crop may be simply a sac for receiving the food or it may be an accessory digestive organ, the juices which it secretes serving to soften and macerate food stored in it. In pigeons during the breeding season this secretion becomes very abundant and milky in character, and is regurgitated into the mouths of the young along with macerated grain. Such food is popularly called pigeon's milk. Regurgitation is very easy for all birds and is habitual with many as a means of defense or (by lightening their weight) of escape. In both birds and mammals the œsophagus is a musculomembranous tube, made up of an outer layer of longitudinal (contractor) muscle fibres, then a layer of circular (constrictor) muscle fibres, then loose connective tissue containing a thin layer of longitudinal fibres, and finally the glandular mucous membrane, which forms a lining and is generally folded and plaited, often papillose, unless fully distended. See ALIMENTARY SYSTEM.

OESTERLEY, ẽ′stẽr-lĭ, CARL A. H. (1839–). A German landscape painter, born at Göttingen, the son and pupil of Carl Wilhelm Oesterley (1805–91), an historical painter, well represented in the Hanover Museum. He also studied under Bendemann and Deger at the Düsseldorf Academy, turning from religious subjects, which he essayed originally, to landscape. His frequent study trips to Norway after 1870 resulted in such paintings as "Raft Sound" (1879, Breslau Museum), "View on Salten Fiord" (1882, Hamburg Gallery), "Lodenwand on North Fiord" (1885, National Gallery, Berlin), and "Romsdal Fiord" (1891, Leipzig Museum), all distinguished by brilliant coloring, and fine light effects.

OETINGER, ẽ′tĭng-ẽr, FRIEDRICH CHRISTOPH (1702–82). A German theologian. He was born at Göppingen, Württemberg, and studied at Tübingen, where he devoted himself to the philosophy of Leibnitz and Wolf. He became intimate with Bengel, Francke, Spangenberg, and Zinzendorf. After traveling extensively he served as reader of theology at Halle. Appointed pastor at Hirschau in 1738, he became the leader of the Pietists in that part of Germany. About this time he began to study earnestly the writings of the mystic Böhme, and became an ardent disciple of Emanuel Swedenborg (q.v.), some of whose writings he translated into German. In 1765 he published a treatise entitled *Earthly and Heavenly Philosophy*, which, with his translation of the works of Swedenborg, brought upon him the reprehension of his ecclesiastical superiors. Yet, protected by the Duke of Württemberg, he was nominated to the superintendence of the churches in the districts of Weinsberg and, later, Herrenberg, and subsequently was appointed prelate at Murrhardt. His works, about 70 in number, were edited by Ehmann (11 vols., Stuttgart, 1858–63) and his autobiography by Hamberger (ib., 1845). Consult his *Life* by Ehmann (Stuttgart, 1859); Auberlen, *Die Theosophie F. C. Oetingers nach ihren Grundzügen* (Tübingen, 1847); J. Herzog, *Friedrich Christoph Oetinger* (Stuttgart, 1902).

OETTINGEN, ẽt'tĭng-*en*, ALEXANDER VON (1827–1905). A German theologian. He was born at Vissust, near Dorpat, and studied at Erlangen, Bonn, Berlin, and Rostock. From 1854 to 1891 he was professor of theology at Dorpat. He published, among many other theological treatises, *Die Moralstatistik in ihrer Bedeutung für eine christliche Sozialethik* (1866–74; 3d ed., 1882) and *Die Moralstatistik und die christliche Sittenlehre* (1869–74), which are his chief works; *Wahre und falsche Autorität mit Beziehung auf die gegenwärtigen Zeitverhältnisse* (1878); *Lutherische Dogmatik* (1897–1902).

OETTINGEN, ẽt'tĭng-*en*, ARTHUR VON (1836–). A German physicist and writer on the theory of music. He was born in Dorpat and, after studying there and in Berlin, became professor (1865) of physics in the University of Dorpat. Thence, in 1893, he went to Leipzig as docent, becoming honorary professor in 1894. He founded a meteorological observatory at Dorpat in 1860 and wrote *Die Korrektion der Thermometer, insbesondere über Bessels Kalibriermethode* (1865), *Meteorologische Beobachtungen, 1866–75* (1866–77), and on musical theory, *Harmoniesystem in dualer Entwicklung* (1866). He was an editor of Ostwald's *Klassiker der exakten Wissenschaften* and, with Feddersen, of the third, and alone of the fourth, volume of Poggendorf's *Biographisch-litterariches Handwörterbuch, 1858–93* (1898, 1904). His later work includes *Elemente des geometrisch-perspektivischen Zeichnens* (1901); *Die Schule der Physik* (1910); *Das duale Harmoniesystem* (1913).

OF'FA (?–796). A king of the Mercians in Anglo-Saxon England who succeeded the usurper Beornræd in 757. The Kingdom was much weakened by domestic feuds, and he probably spent the early years of his reign in restoring order at home. In 771 he began to conquer outlying territory; he defeated the Kentish forces in 774 and fought against the West Saxons (779) and the Welsh. (See OFFA'S DYKE.) Offa had cordial relations with the Roman see, won from Pope Hadrian I the grant of a Mercian archbishopric, and sent yearly to Rome for charities 365 mancuses (apparently the origin of Peter's pence), besides doing much for the benefit of the Church at home. He carried on a correspondence with Charlemagne and promoted trade between England and the Continent. Consult Thomas Hodgkin, *Political History of England*, vol. i (London, 1906), and C. W. C. Oman, *England before the Norman Conquest* (New York, 1910).

OF'FALY, LORD. See FITZGERALD, THOMAS.

OFFA'S DYKE. An ancient earthwork extending along the whole border between England and Wales and attributed to Offa, King of Mercia. Portions of this rampart still stand to a considerable height, though much of it has been almost obliterated by time and the elements. This structure, which represents a vast amount of labor, seems to have been intended as a line of demarcation between the Anglo-Saxon and Celtic populations of England and Wales respectively. On the eastern or English side of Offa's Dyke at varying distances from it is an inferior earth rampart called Watt's Dyke, and it is conjectured that the space between them may have been a neutral zone for trading purposes.

OFFENBACH, ŏf'f*e*n-bäG. A town in the Grand Duchy of Hesse, Germany, on the Main, 4 miles east of Frankfort (Map: Germany, C 3). Its palace is the winter residence of the Isenburg-Birstein family, to whom the old castle, now in ruins, also belongs. Several churches and a synagogue are the only other noteworthy edifices. Offenbach is the principal manufacturing town in the grand duchy, its chief manufactures being saddlery and leather goods, shoes, soaps, perfumery, lacquer, dyes, celluloid, dress trimmings, rubber goods, engines, tobacco, textiles, chemicals, jewelry, and carpets. Many of the factories are driven by compressed air furnished from a central power plant. From its lithia spring, the Kaiserfriedrichquelle, 4,000,000 bottles of water are exported annually. Pop., 1900, 50,508; 1910, 75,583. Offenbach was founded in the tenth century. In 1685 the Isenburg-Birstein family made it their residence. Its importance dates from the participation of the grand duchy in the German Zollverein in 1828. It was united with the Grand Duchy of Hesse in 1815.

OFFENBACH, JACQUES (1819–80). A French operetta composer, born at Cologne of Jewish parentage, June 21, 1819. He went to France in 1833 and studied the cello at the Paris Conservatory under Vaslin. Afterward he played that instrument in the orchestra of the Opéra Comique and then became music director at the Théâtre Français. While at the latter theatre he wrote the *Chanson de Fortunio* for the *Chandelier* of Musset. He became director of the Bouffes-Parisiens in 1855 and produced his operas there until 1866, after which date they were brought out at different houses. In 1876 he made an unprofitable tour in America, which he described in *Notes d'un musicien en voyage* (1877). The libretto is an indispensable part of Offenbach's operettas. In the witty words and doubtful, if amusing, situations of Meilhac and Halévy lay the opportunities for his own best humor and most ironical caricature. For the rest his merry music, natural verve and extravagance, and the affluence of his ideas made his operettas the highest form of the genre he created and of which he remains the undisputed master. He died in Paris, Oct. 5, 1880. Of his 102 operas and operettas the more important are: *Les deux aveugles* (1855); *Le violoneux* (1855); *Le financier et le savetier* (1856); *Croquefer ou le dernier des paladins* (1857); *Le mariage aux lanternes* (1857); *La chatte métamorphosée en femme* (1858); *Orphée aux enfers* (1858); *Daphnis et Chloé* (1860); *Barkouf* (1860); *Monsieur et Madame Denis* (1862); *La belle Hélène* (1864); *Barbe-Bleue*

(1866); *La grande duchesse de Gérolstein* (1867); *La vie parisienne* (1866); *Robinson Crusoé* (1867); *Vert-Vert* (1869); *Les brigands* (1869); *La jolie parfumeuse* (1873); *Madame Favart* (1879); *La fille du tambour-major* (1879); *Belle Lurette* (1880). Two posthumous works, *Les contes d'Hoffmann* and *Myriame et Daphné* had their first performance in 1881 and 1907 respectively; the former became especially popular. Consult Martinet, *Offenbach, sa vie et son œuvre* (Paris, 1892), and Paul Bekker, *Jacques Offenbach* (Berlin, 1909).

OFFENBURG, ŏf′en-bụrk. A town in the Grand Duchy of Baden, Germany, on the Kinzig, 10 miles southeast of Strassburg (Map: Germany, B 4). It contains ruins of old fortifications, numerous monuments, a town hall in the baroque style, and a Gymnasium occupying an old Capuchin monastery. The manufactures are of cotton, linen, hats, brushes, felt, cartons, cement, stained glass, leather, dyes, and lithograph work. The town has a good trade in wine, timber, and cattle, and is an important market. Pop., 1900, 13,664; 1910, 16,848.

OF′FERING (AS. *offrung*, *ofrung*, from *offrian*, from Lat. *offerre*, to offer, from *ob*, towards, before + *ferre*, to bear; connected with Gk. *φέρειν*, *pherein*, Skt. *bhar*, Goth. *bairan*, OHG., AS. *beran*, Eng. *bear*). A term primarily applied to the different forms of sacrifices in the Hebrew ritual. Offerings are of various kinds, as the burnt offering (*‘ōlāh*), peace offering (*shelem*), thank offering (*tōdāh*), free-will offering (*nĕdābāh*), meal offering (*minchāh*), sin offering (*chaṭṭāth*), guilt offering (*’āshām*), drink offering (*nesek*). The common Hebrew word for an offering in the sense of a ritualistic sacrifice is *ḳorbān*, which designates the sacrifice as something brought near to the deity, or to the altar, and as such *ḳorbān* is occasionally used to designate a sacred gift in general. (See CORBAN.) Another term for offering in a more secular sense is *minchāh*, which is primarily a tribute offered either by way of a compliment or for the purpose of retaining the good will of an individual or a deity. In Gen. iv *minchāh* is used alike of Abel's bloody sacrifice and Cain's vegetable offering; but in the Mosaic ritual *minchāh* acquired the technical sense of a meal (or bloodless) sacrifice, in contrast to *zebach* (slaughter), which is invariably a bloody sacrifice. Another specific form of religious offerings, though distinct from sacrifices, is the heave offering (*tĕrūmāh*), denoting (*a*) that which is lifted off or separated and used of the gifts taken from the soil (first fruits, tithes, firstlings); (*b*) contributions of money and spoils of war offered for sacred purposes; (*c*) portions of the sacrifices and other dues belonging to the priests. See FIRST FRUITS; OFFERTORY; SACRIFICE.

OF′FERTORY (OF., Fr. *offertoire*, from Lat. *offertorium*, place where offerings are brought, from *offertor*, one who offers, from *offerre*, to offer). In the liturgical sense, an antiphon in the mass which introduces the more sacred part or *missa fidelium*, as the analogous introit (q.v.) does the *missa catechumenorum*. It is taken from the Psalms (since the thirteenth century limited to a single verse, except in requiem masses), and varies with the season or festival. It receives its name from the fact that it is immediately followed by the oblation of the bread and wine. A modern use of the term is for the collection of money made at a religious service and also for the music which is rendered at the time.

OF′FICE (OF., Fr. *officier*, from ML. *officiarius*, officer, from Lat. *officium*, office, from *opificium*, performance of work, from *opifex*, workman, from *opus*, work + *facere*, to do). In general, a delegated service or authority of a public or semipublic character. In practice the term is usually limited to positions of trust or authority under the government or in a corporation or voluntary association. At the common law public office was not regarded as a public trust, but as a private emolument, and Blackstone in his book on property classes offices with the species of real property known as incorporeal hereditaments. Thus conceived, a public office may, like other real property, be held in fee simple, in fee tail, for life, or for years, and it may even be made the subject of sale and be alienable by deed or will. Offices of this character have generally become obsolete or have been abolished, but in England certain honorary offices are still held by a species of tenure and descend to the heirs of the holder. See CIVIL SERVICE.

An appointment to office carries with it, as an incident thereof, the right to its emoluments. Civil or public offices are usually classified as ministerial and judicial. An office is ministerial when the manner of its exercise depends on the command or direction of others; judicial when the officer is called upon to employ his own discretion. An example of the first is the office of sheriff; of the second that of a judge of a court of law. In many instances, however, both ministerial and judicial functions may be combined in one and the same office. The office is held for the benefit of the public, and may be abolished by legislation, unless such action be expressly forbidden by the constitution. When the office is in its nature judicial the duties cannot be performed by deputy, as the personal skill and judgment of the officer are the reasons for his holding the office. With ministerial offices the reverse is the case. Thus, a sheriff or other court officer may appoint deputies, and their acts are good in law, and the appointing officer remains responsible for such acts.

Statutes in most of the States provide that offices shall not be sold, and such a sale would to-day be void anywhere as contrary to public policy. So any agreement between the officer and one who by influence procures his appointment to divide the compensation received is altogether void. It was a principle of the common law that no term of office should be created so as to end at a certain time in the future, nor for a fixed term of years, but should be held for life or during good behavior. It is common in the United States to limit the term of office to a fixed period of years, rarely, as in the case of justices of the United States Supreme Court, to the life of the incumbent and to the attaining of a certain age, as 70 years. Two offices cannot be held by the same person where one is in the nature of its duties inconsistent with the other. This inconsistency may be patent from the nature of the offices or it may be declared to exist by act of legislation. Where an office is filled in common by several persons it has been held that if the office is of a public character all the officers must meet for consultation, but that a majority may act, while if the office is private all must concur; but this is often governed by statute, and a decision by a majority, or even a majority of those present at any meeting, is usually made binding. Members of State or national legislatures are not usually termed officers, the word being confined in usage to those having executive or judicial authority. A de facto officer is one who is in possession of the authority and emoluments of an office without a good title thereto, while a de jure officer is one who has the legal right but not necessarily actual possession. It is evident that it would create much confusion and cause great injustice if all official acts of a de facto officer were to be considered as of no effect. Accordingly the official acts of such an officer performed during his actual occupancy of the office are usually held to be valid, on the theory that such official acts are the acts of the office and not of the person who has usurped its functions. But if suit be brought by a de facto officer in his public capacity, he may be debarred from recovery on the ground of defect in title, and the de jure officer may test the question of title by bringing a writ of quo warranto. See De Facto.

Public officers of the United States are appointed, under the provisions of the Constitution, by the President with the advice and consent of the Senate, with the exception that to Congress is given the power to vest in the President alone, or in the heads of departments or courts of law, the appointment of inferior officers. Ambassadors, public ministers and consuls, and Supreme Court judges are specified as not belonging to this inferior class, but beyond that the distinction is not clearly defined. In the various States the method of appointment of public officers is regulated by the State constitution or, more commonly, by statute. The appointee in most cases is required to take an oath to perform faithfully the duties of the office. A bond is often required where the officer has charge of financial interests or his duties affect property rights. Where he performs official acts before giving bond or taking oath, such acts will be valid unless he has been specially prohibited by statute or constitution from holding the office before the bond was filed or the oath administered.

Compensation of officers may be fixed by law or may be obtained from fees. It is provided in the United States statutes that no officer of the government who holds an office with a salary of $2500 or more shall receive extra compensation for performing the duties of any other office unless expressly authorized by law.

The law will presume that a public officer is acting within the scope of his duty until the reverse has been shown. Where discretionary power is given the officer is made the exclusive judge of the facts. Except in the case of judges of superior courts officers are liable for wrongful acts both to the injured party and to the state. In the first case remedy is by action, in the second by indictment or impeachment. The order of a superior is no bar to an action arising from an unlawful act of the inferior, nor is negligence on the part of a subordinate ground for holding the head officer responsible. Contracts made by public officers are governed by the general law of agency and they cannot bind the government beyond the extent of their legal authority. If an appropriation is exceeded the officer is liable to the state for the excess.

The method of removing a public officer of the United States is not provided for in the Constitution, and the question arises whether the power of removal belongs to the President alone or whether he must receive the consent of the Senate. The question has several times come before Congress, and the power of the President to act alone has been sustained by a very close vote. By statutes of 1867 and 1869 it was provided that a civil officer appointed by the advice and consent of the Senate shall hold his place until removed by the same authority, but that during a recess of the Senate the President may suspend such officer and appoint another to perform the duties of the position. The President is to make a nomination within 30 days after the beginning of the next session of the Senate; and in case the Senate directly refuse to confirm, he may nominate another person. These statutes are known as the tenure-of-office acts (q.v.). State officers may in many cases be removed by the Governor; the subject is governed by statutory enactments, which vary greatly in the different States. Elective offices cannot be vacated by an executive officer without showing cause, such as malfeasance or embezzlement. A term of office may be extended or reduced by action of the Legislature unless such action be prohibited by constitutional provision or the office be elective in its nature. Officers of the United States courts hold during good behavior, but those of the Territorial courts do not fall within the clause of the Constitution already referred to, and depend upon the action of Congress for the limitation of their terms. If neither State nor national Constitution prescribe the length of a term, the subject is under legislative control, and may be extended or shortened, or the office abolished altogether. See Officer, and such titles as Director; Governor; President; Secretary; etc.; and consult authorities under Agent; Administrative Law; Government; Municipality.

OFFICE, Holy, Congregation of the. See Inquisition.

OFFICE BUILDINGS. The erection of edifices specially or exclusively designed for the public rental of business offices is a modern development, originating and chiefly worked out in the United States. Previous to 1880 banks and insurance companies were frequently housed in special structures, which with the increasing cost of land and concentration of business in limited areas, were sometimes built with a number of stories of offices for public rental, providing revenue as well as accommodation for the company's own business. Among early examples of this practice are the original Equitable and the present New York Life Insurance buildings, and others in Hartford and Boston. With the recovery of business from the panic of 1873 there began, in the larger American cities, a remarkable movement for the erection of specially designed public office buildings. The Boreel and Washington buildings (1879–82) and the Mills, Potter, and Temple Court buildings (1881–83) were among the early products of this movement, which soon became general. Banks, insurance companies, newspapers, publishing houses, and religious and charitable organizations contributed to it by erecting huge office buildings of which they occupied only the lower stories (World Building, American Tract Society Building in New York, Masonic Temple, Chicago, etc.). The development of the elevator, of fireproof construction (q.v.), and of the modern steel-frame system (1891–93) successively stimulated this movement, resulting in the creation of the skyscraper (q.v.) type of building. In 1876 the tallest office building was the Tribune Building of New York; in 1893 the Chicago Masonic Temple; since then the record for height has been successively held by the Singer, Metropolitan Life, and Woolworth buildings in New York, the latter being 756 feet high, with 52 stories.

The essentials of the modern American office building are the provision of the maximum possible number of offices on each floor, receiving each an abundance of daylight and air, accessible by straight corridors from elevators centrally placed and sufficiently numerous to provide ample service at all times. The entrance vestibule and hall are made as attractive and elegant as possible, and in the larger buildings treated monumentally and often furnished with shops on either hand. In the higher buildings (15 to 40 or 50 stories) some of the elevators are run "express," making no stops below the eighth or tenth floor. The stairs must be sufficient for the entire tenantry in case of interruption of the elevator service.

Many offices have several acres of total floor space, housing as many as 3000 or 4000 tenants. The largest floor area in any office building is that of the new Equitable Life Building in New York—over 24 acres in 32 stories.

The American type of office building is practically unknown in Europe. Although commercial architecture has there produced many notable buildings for banks, insurance, newspaper, and other corporations, in which a certain amount of space is rented out, there are few or no buildings erected exclusively for the public hiring of space for miscellaneous business. This is due partly to differing economic conditions and partly no doubt to the prevalent restrictions on the height of buildings in European cities.

OFFICE FOUND. In the proceeding known as inquest of office a finding by the jury that the property which is the subject of the inquest is forfeited to the crown or state. Such a finding, by which lands were formerly declared forfeited under the feudal laws, is now in the United States generally a necessary part of the proceedings that must be taken to enforce the forfeiture to the state of lands held by aliens who at common law are under a legal disability to hold lands vested in them, and also of the proceedings taken to vest in the state title to lands left by a person who dies intestate without heirs to inherit the same. The procedure, however, is rarely resorted to against an alien while living; and sometimes upon the death of an alien who leaves no lawful heirs, and whose natural heirs are disqualified to take his lands, special statutes are passed waiving the forfeiture to the state and restoring the lands to the natural heirs. See ALIEN; ESCHEAT; FORFEITURE; INQUEST, *Of Office*.

OFFICER. In a general sense, a person who holds an office or who is vested with authority to perform certain functions or do certain acts in the interest of, or in and about the management or direction of, a business or a government. As respects a private business the term is generally applied to such members of a corporation as are specially intrusted with the general management of its affairs. Under this class are commonly included the president, directors, treasurer, secretary, and other persons similarly intrusted with an active participation in the general affairs of the company by the constitution or by-laws. See CONTRACT; CORPORATION; DIRECTOR; ULTRA VIRES; and also consult the authorities referred to under CORPORATION.

A public officer, or officer of government, is a person who is invested with the authority to act in behalf of a national, state, or municipal government under some provision of law and by virtue of a commission or other certificate of authority issued to him.

An officer is to be distinguished from an employee of a government or of a government official. The most important distinction is that an employee is such by virtue of a contract, while an officer finds the source and limitations of his authority in some act of governmental power. The conception of an officer, however, does not depend in any way upon the character of the duties to be performed, nor is it essential that the officer should be invested with any power of compulsion, or that he should be permanently occupied in the discharge of official duties, or that his duties should or should not be discretionary. The only requirement is that the duties shall be discharged in the interest of the government, and that the right to discharge them shall be based upon some provision of law and not upon contract. Governmental officers are commonly classified with reference to the nature of the authority conferred upon them, as *executive*, or those whose duties are mainly to enforce the execution of the laws; *legislative*, or those whose duties relate chiefly to the enactment of laws; and *judicial*, or those whose duties relate chiefly to the interpretation and application of the laws. With reference to scope of their authority officers are also classed as *ministerial*, or those whose duties are chiefly to carry out the lawful instructions of their superiors, and *judicial*, i.e., such as have a large discretionary power vested in them.

Another important classification is that of honorary and professional officers, *professional officers* being those who devote their entire time to the discharge of public functions and are restricted by law from exercising any other occupation, and who receive a compensation sufficiently large to enable them to live without resorting to other means. *Honorary officers*, on the other hand, are those who are not required to devote their entire time to their public duties, but may at the same time carry on some regular business as a means of support, and receive a compensation which is insufficient for support, or merely nominal, or may receive no compensation at all. In the United States the legal distinction which most nearly corresponds to this is that between *lucrative* and *honorary* officers, the conception of professional officers being not yet fully worked out.

Most officers become such either by appointment or by election, the method of election being much more common in the United States and in England than in most other modern countries. The official relation is sometimes created by drawing of lots, as in the case of a jury, or as a result of seniority, or sometimes by inheritance. In general it can be created only in one of the ways recognized by law, and the acts of persons who assume to be officers without right are void both as against the public and third parties; but persons who, though not legally officers, are yet acting under color of right are regarded as lawful officers for many purposes and are called officers de facto. In England and in the United States, since the reign of Queen Anne, the rule has been that the title to an office may be tried by a writ of quo warranto or an information in the nature of a quo warranto. One who is clearly entitled to an office may obtain possession of the insignia of the office, the public quarters, records, etc., by mandamus proceedings.

The general obligations imposed upon officers are of two kinds: first, those which the law positively states that the officers must or must not do, and the violation of which is punished by penalties of a criminal character; second, those which arise from the very existence of the official relation, and which are maintained chiefly by the esprit de corps of the official body. When the esprit de corps is high the system of positive requirements is usually correspondingly weak.

See OFFICE, and the titles treating of various public officers, as BAILIFF; DEPUTY; NOTARY PUBLIC; ETC.; also CONSTITUTIONAL LAW; DE FACTO; ETC.; and consult the authorities referred to under ADMINISTRATIVE LAW; GOVERNMENT.

OFFICER, FLAG. See FLAG OFFICER.

OFFICER, PETTY. See PETTY OFFICER.

OFFICERS, MILITARY AND NAVAL, COMMISSIONED. See RANK AND COMMAND.

OFFICIAL PLANTS (formerly *officinal*, from ML. *officinalis*, of or relating to a shop, from Lat. *officina*, *opificina*, shop, from *opifex*, workman). Those medicinal plants which have a place in the pharmacopœias of different countries and are therefore sold by apothecaries and druggists.

A distinction was formerly made between officinal and official drugs. *Official* designated those plants or drugs recognized by the various pharmacopœias; *officinal* those kept prepared in apothecary shops, as distinguished from *magistral drugs*, those prepared according to a physician's prescription. With the multiplication of drugs and increasing complexity of pharmaceutical processes, this distinction gradually became impracticable and obsolete, and the *United States Pharmacopœia* of 1890 dropped the term "officinal."

OFFICINAL (ŏ-fĭs′ĭ-nal *or* ŏf′ĭ-sī′nal) **PLANTS.** See OFFICIAL PLANTS.

OFF′SET, or SET-OFF. The splay or sloping part of a wall, etc., joining parallel surfaces when the upper face recedes from the lower. This frequently occurs on buttresses. The offset is usually protected with dressed stones having a projection or drip on the lower edge to prevent the rain from running down the wall. In surveying an *offset* is a line perpendicular to a given straight line on which a point may be located at some measured distance. Such points on various offsets may determine the position of an irregular or inaccessible line and make it possible to map accurately a plot of land whose boundaries are unsymmetrical or difficult of access. See SURVEYING.

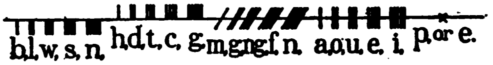
OFFSET. A lateral shoot, either a stolon or sucker, which strikes root and forms a new plant. Strawberries, multiplier onions, and black raspberries are familiar examples of plants generally propagated by offsets.

OG, ŏg (Heb. *'Og*, probably connected with *'Agag*). An Amoritish king of Bashan, who is said to have lived at the time of the entrance of the Israelites into Canaan. The chief cities of his territory were Ashtaroth and Edrei, and he and his people were defeated at the latter place by the half tribe of Manasseh which remained east of the Jordan (Deut. iii. 1–13; Josh. xiii. 12). Og is represented as the last of the Rephaim or giants. The story of his bedstead (Deut. iii. 11) may be based on the huge sarcophagi which Phœnician kings had made in imitation of Egyptian customs. See AMORITES.

OGAM, ŏg′am (OIr. *ogam*, *ogum*, Ir. *ogham*, Gael. *oghum;* according to Rhys it is connected with Gk. *ὄγμος*, *ogmos*, row, Skt. *ajman*, course, from aj, Gk. *ἄγειν*, *agein*, Lat. *agere*, to drive). The name of a script used in various ancient inscriptions in the British Isles. There are nearly 300 of these inscriptions, of which 54 have been found chiefly in the southern parts of Ireland and Wales, and the earliest of them date probably from the fifth century. The language in almost every case is a primitive form of Gaelic, but some 10 of them found in Scotland are thought by some scholars to be Pictish. The interpretation of these last is entirely doubtful.

The invention of the ogams is assigned in Irish tradition to a god Ogma (one of the Tuatha de Danann), and this name corresponds very well to Ogmios, described by Lucian as a Gaulish Hercules. There existed a kind of pedantic puzzle speech, also called Ogam, some examples of which have been preserved in Middle Irish manuscripts. But this is to be carefully distinguished from the ancient Ogam alphabet used in inscriptions. The old alphabet was apparently known down to the Middle Irish period, and inscriptions or messages written in Ogam figure more or less frequently in the popular sagas.

The characters have been nearly all made out by recent investigation, thanks to a key to some of these inscriptions contained in the Book of Ballymote, a manuscript of the fourteenth century. They are cut along a vertical line and read from the bottom upward. In the alphabet which follows the horizontal line running from left to right represents the edge upon which the notches and lines are graven:



A few of the monuments are bilingual. There are 21 signs in all, though certain inscriptions offer an additional sign whose value is obscure. The sign for the letter *p* seems to be of more recent origin than the others, as this letter was foreign to the Old Irish alphabet and was no doubt introduced when the Romans invaded Britain.

The inscriptions contain almost nothing besides proper names, but these are of great value for the light they throw upon primitive Celtic phonology and inflection. Compare the article on IRISH LITERATURE.

Bibliography. R. R. Brash, *The Ogam Inscribed Monuments of the Gaedhil in the British Islands* (London, 1879); Sir John Rhys, *Lectures on Welsh Philology* (2d ed., ib., 1879); R. A. Stewart Macalister, *Studies in Irish Epigraphy*, part i (3 parts, London, 1897–1907); Abercromby, "The Ogham Alphabet," in the *Academy*, vol. xviii (London, 1880); D'Arbois de Jubainville, "L'Alphabet irlandais primitif et le dieu Ogmios," in *Académie des Inscriptions et Belles-Lettres* (Paris, 1881); Loth, "Le Sort

et l'écriture chez les anciens Celtes," in *Journal des Savants* (ib., 1911). For the grammar of the Ogam writing, consult MacNeill, "Oghmóracht," in *Gaelic Journal*, vols. xviii, xix (Dublin, 1908–09); "Notes on the Distribution, History, Grammar, and Import of the Irish Ogham Inscriptions," in *Proceedings of the Royal Irish Academy*, vol. xxvii (Dublin, 1909). The Pictish problem is discussed by Sir John Rhys, "The Inscriptions and Language of the Northern Picts," in *Proceedings of the Society of Antiquarians of Scotland* (Edinburgh, 1892); id., *Celtic Britain* (3d ed., London, 1904); E. W. B. Nicholson, *Keltic Researches* (ib., 1904). On the Ogmic puzzle writing see Thurneysen in the *Revue celtique*, vol. vii (Paris, 1877).

OGASAWARA-JIMA, ō-gä'sȧ-wä'rȧ-jē'mȧ (Jap., islands (owned by) Ogasawara). The Japanese name of the Bonin Islands (q.v.).

OG'DEN. A city and the county seat of Weber Co., Utah, 37 miles by rail north of Salt Lake City, at the confluence of the Ogden and Weber rivers and on the Union Pacific, Southern Pacific, Oregon Short Line, Salt Lake and Ogden, and Rio Grande Western railroads (Map: Utah, C 1). It is the seat of the State Industrial School (reformatory) and of State institutions for the deaf, dumb, and blind, of Sacred Heart Academy (Roman Catholic), and of Weber Stake Academy (Mormon). The principal buildings are the city hall, county courthouse, hospital, Carnegie library, and several of the public school buildings. Union, Lester, and Liberty parks, respectively 5, 10, and 10 acres in area, are notable attractions. The Ogden Cañon, opening at the city limits, is noted for its widely picturesque scenery and for its waterfall; and of interest also are Weber, Waterfall, and North Ogden cañons. A pipe line serves to convey an immense electrical energy supplying light, heat, and power for Ogden and Salt Lake City. The city has valuable natural advantages due to its location in a productive agricultural, fruit-growing, and mineral region. An important railroad junction, it controls large commercial interests in an export trade in beet sugar, canned goods, grain, and fruit, and as a distributing centre for the surrounding country. Its industrial enterprises, also important, are represented by cement mills, canneries and can factories, brick and tile works, a broom factory, pickle works, cereal factories, etc. Ogden was founded in 1848, was laid out as a city under the direction of Brigham Young in 1850, and was chartered in 1851. The original charter previously governing the city, dated 1861, was repealed by the Legislature of 1898, which enacted a general law for the government of cities and towns of the State, but this has been replaced by the commission form of government. Pop., 1900, 16,313; 1910, 25,580; 1914 (U. S. est.), 29,528.

OGDEN, Aaron (1756–1839). An American soldier and lawyer, born at Elizabethtown, N. J. He graduated at Princeton in 1773, entered the Revolutionary army in 1777, and served with distinction until the close of the war, when he was discharged with the rank of major. In 1801 the Federalist Legislature of New Jersey chose him United States Senator and in 1812 the same party elected him Governor of the State. He afterward went into partnership with Daniel Dod (q.v.) for the purpose of running a steamboat between Elizabethtown and New York, and this brought him into conflict with Livingston and Fulton, to whom an exclusive right had been granted. Years of litigation resulted in Ogden's financial ruin. From 1829 until his death he was president of the Society of the Cincinnati. Consult A. O. Dayton, *Address before the Whig and Cliosophic Societies of the College of New Jersey* (Princeton, 1839), and *Collections of the New Jersey Historical Society*, vol. vii (Newark, 1872).

OGDEN, Peter Skene (or Skeen) (1794–1854). A fur trader, one of the earliest explorers in the extreme northwestern part of the United States and in southwestern Canada. He was born in Quebec, his father, Judge Isaac Ogden, having lived in Newark, N. J., before 1783. Ogden became a partner in the Northwest Company, and when that was absorbed in 1821 by the Hudson's Bay Company became prominent in the latter. He was on the Columbia River as early as 1819 and in 1827 was on a river which he named Sastise after the tribe living on it. "There is a mountain equal in height to Mount Hood or Vancouver," he says. "I have named it Mount Sastise." This was Mount Shasta. In 1828, and perhaps as early as 1825, he was on a river in Nevada which for a time was called by trappers Ogden's, and Mary's River, but which in 1845 was named Humboldt by Frémont, the first to explore it scientifically. After 1823 Ogden lived with a Spokane woman, a stepdaughter of François Rivet. They had several children, but Ogden refused, even when dying, to have this marriage legalized, on the ground that his long recognition of the woman as his wife was sufficient. She died in 1886, at the age of 98. One of the deeds which particularly stands to Ogden's credit was his rescue, with fine tact and skill, of the remnant of the Marcus Whitman (q.v.) settlement from the Cayuse Indians, who held them prisoners after the massacre of 1847. Ogden was 12 days in reaching the vicinity and it was five days more before he succeeded in persuading the tribe to give their prey into his keeping and seven before he got them all. He always remained a British subject, though he lived till his death in Oregon City. Ogden spoke French, and some of the Indian languages of the region, as well as he spoke English. He visited New York in 1852. The next year there was published in London a little book ascribed to Ogden, at least in so far as the main facts are concerned, *Traits of American Indian Life and Character by a Fur Trader*. It is extremely rare. Consult: Ross Cox, *Adventures on the Columbia River* (New York, 1832); Alexander Ross, *Fur Traders of the Far West* (2 vols., London, 1855); G. K. Warren, in *Pacific Railroad Report*, vol. xi (Washington, 1861); H. H. Bancroft, "History of Utah" and "History of Nevada," in *History of the Pacific States*, vols. xx, xxi (San Francisco, 1889–90); Oregon Historical Society, *Quarterly*, vols. x, xi (Portland, 1909–10); A. C. Laut, *The Conquest of the Great North-West* (new ed., New York, 1911).

OGDEN, Robert Curtis (1836–1913). An American merchant and promoter of education in the South. He was born in Philadelphia. From 1885 to 1907, when he retired, he was a member of the firm of John Wanamaker, and in 1889 he was a member of the Pennsylvania State Johnstown Flood Relief Commission. He served as trustee of the General Education Board and of the Tuskegee Institute, Alabama, as president of the Southern Education Board and of the

Conference for Education in the South, as president of the directors of Union Theological Seminary, New York, and was particularly well known for his interest in Hampton Institute, Virginia, having been president of its board of trustees for many years. He received honorary degrees from Yale and Tulane universities and from Union College. His writings include: *Pew Rents and the New Testament* (1892); *Sunday School Teaching* (1894); *Samuel Chapman Armstrong* (1894).

OGDEN, Rollo (1856–). An American newspaper editor. He was born at Sand Lake, N. Y., graduated from Williams College in 1877, and studied at Andover (1877–79) and Union (1879–80) theological seminaries. He was associate pastor of the First Church of Cleveland, Ohio, in 1880–81, was then ordained to the Presbyterian ministry and served as a missionary in Mexico City in 1881–83, and was pastor of the Case Avenue Church of Cleveland in 1883–87. Thereafter identified with literary or newspaper work in New York City, he joined the staff of the *Evening Post* in 1891. As editor of this paper after 1903 he maintained the editorial page at the high level of excellence set by his predecessors. He published *William Hickling Prescott* (1904).

OGDEN, William Butler (1805–77). An American railroad official. He was born at Walton, N. Y., and became a member of the New York Legislature in 1834. In 1835 he removed to Chicago and upon its incorporation as a city in 1837 became the first mayor. He was instrumental in building the Galena and Chicago Railroad, of which he was made president in 1847. He advocated canal improvement, was president of the Chicago, St. Paul, and Fond du Lac Railroad in 1855, and when, by the consolidation of smaller railroads, the Chicago and Northwestern was formed, he became its president. He was a strong advocate of the Pacific railroads and was the first president of the Union Pacific Company. In addition to his railroad interests he was largely engaged in lumbering in Wisconsin. He was also the promoter of many philanthropic and educational movements in Chicago.

OG'DENSBURG. A city and port of entry in St. Lawrence Co., N. Y., 137 miles by rail north by east of Syracuse. It is on the St. Lawrence River, at its confluence with the Oswegatchie, and opposite Prescott, Ontario, with which it is connected by steam ferry, and on the New York Central and Hudson River and the Rutland railroads (Map: New York, E 1). Among the prominent educational and charitable institutions are the Ogdensburg Free Academy, St. Lawrence Hospital (State), city hospital, St. John's Hospital, Northern New York General Hospital, and United Helpers Home. The city has also a fine United States customhouse and post office, State armory, city hall, public library, Roman Catholic cathedral, and Riverside, Hamilton, Mansion, Crescent, and Grove parks. Ogdensburg, as the terminal of deep-water navigation on the Great Lakes, has regular steamship communication with the principal lake ports and carries on an important trade in grain, lumber, and general produce, as well as manufactured products, principally lumber, brass curtain rods, silk, and skirts. The value of its imports, according to the thirteenth census, was $21,074,499, while its exports amounted to $6,869,197. Many of its industrial establishments utilize water power derived from the river and electric power from Hannona Falls. First settled in 1749, Ogdensburg was incorporated as a village in 1817 and received a city charter in 1868. The government, under the original charter as subsequently amended, is vested in a mayor elected every two years, a common council, and administrative officials, the majority of whom are elected by the council or confirmed by that body. The civil-service commission is appointed by the mayor, and the board of education, one of whose members acts as president, is chosen by popular vote. The water works are owned and operated by the municipality. Pop., 1900, 12,633; 1910, 15,933; 1915 (State census), 16,360.

OGÉ, ŏ'zhâ', Jacques Vincent (c.1755–91). A Haitian insurgent. He was born at Dondon a free man, but a mulatto, served for several years in one of the German armies, and in 1791 was sent to the Constituent Assembly as a representative of Haiti. When he returned to the island, he petitioned the Assembly to free the slaves there. But he was unsuccessful and took up arms in the autumn of 1791, having organized a company in the United States. He won a few battles, then was defeated, and surrendered after receiving a promise from the French Governor, Count de Blanchelande, that his life would be spared; but the Governor flagrantly broke his word, and Ogé was seized, tried, and executed.

OGEE' (probably a corruption of *ogive*). A double or reversed curve. An ogee molding is a cyma (q.v.), especially a cyma reversa; an ogee arch, a pointed arch made by the meeting of two ogee curves. (See Plate under Arch.) In late Gothic architecture arches of various forms were often inclosed under ogee drip moldings. An ogee door is one whose panels are framed in ogee moldings.

OGEE'CHEE LIME. An American tree. See Tupelo.

OGGIONE. See Oggiono.

OGGIONO, ŏd-jŏ'nô, Marco da (c.1470–c.1530). An Italian painter of the Milanese school, born at Oggiono on Lake Como. A pupil and imitator of Leonardo da Vinci, under whom he studied as early as 1490, he is best remembered for copies of his master's "Last Supper," one of which (in oil) is in Burlington House, London, another, on a small scale, in the refectory of Santa Maria delle Grazie, Milan, and a third in the Louvre. The important so-called Castellazzo copy, now in the refectory with the original, formerly ascribed to him, is by Solario. As a rule a conventional imitator of Leonardo and a cold, hard colorist, Oggiono yet showed considerable originality and brilliancy in his "Archangels Suppressing Lucifer," in the Brera, and his "Salvator Mundi," in the Borghese Gallery, Rome. The same subject in the Detroit Museum, attributed to Leonardo, is assigned to Oggiono by Berenson.

OGIER (ô'zhyâ') **THE DANE.** One of the most popular of Charlemagne's paladins, the hero of several of the chansons de geste of the Charlemagne cycle, the oldest form of which, "La Chevalerie Ogier de Danemarche," was edited by Barrois and another version by Raimbert. Ogier, son of Godfrey, Duke of Denmark, was brought up as a hostage at Charlemagne's court. His son being killed by the King's son, a long strife ensued, during which Ogier was long besieged in Castle-Fort, defending it with great valor. He inherited the Kingdom of Denmark, but gave it up to return to the French court, and became one of Charlemagne's foremost champions. In extreme old age he was shipwrecked near the island of Avalon and carried off by Morgan le Fay to her magic palace. A ring restored his youth, and a magic crown made him forget the past. Two hundred years later he returned to free France from invaders, probably Normans, after which he was carried away again by Morgan to Avalon. As the Danish national hero, Holger Danske, he still sleeps till danger wakes him. He figures in the literature of several countries. In English legends he is known as the father of Sir Bevis of Hampton and appears in Morris's *Earthly Paradise*. Consult: Carl Vorestzsch, *Sage von Ogier dem Dänen und die Entstellung der Chevalerie Ogier* (Halle, 1891); id., *Der französischer Heldensage* (Heidelberg, 1894); "Les Enfances Ogier," in *Zeitschrift für romanische Philologie*, vol. xxxiii (Halle, 1909).

OGILBY, ŏ'g'l-bĭ, John (1600–76). A British author and publisher, born in or near Edinburgh. He accompanied Strafford, Lord Deputy of Ireland, to Dublin in 1633 and built a little theatre in St. Werburg Street. The outbreak of the Civil War in 1641 ruined him, however, and he returned to London destitute. He then learned Latin and Greek and translated Vergil, Æsop, and Homer. After the Restoration Ogilby enjoyed the favor of Charles II, and, following a brief sojourn in Ireland, he settled in London and became a publisher. The great fire of 1666 destroyed his printing house and stock, but he soon recovered, and during the next 10 years published many fine works, especially geographical and topographical, several illustrated with engravings by Hollar, Lombart, and Faithorne. Dryden and Pope ridiculed Ogilby for the formidable character of his publications.

OGILVIE, ŏ'g'l-vĭ, William (1846–1912). A Canadian surveyor and explorer. He was born at Ottawa, Ontario, began practice as a land surveyor in 1869, and in 1875 the Dominion government put him in charge of extensive surveys to determine the boundaries between Canada and Alaska, Ontario and Quebec, and the Northwest Territories and British Columbia. His explorations in the Mackenzie and Yukon regions won for him the Murchison medal in 1891, when he was made a fellow of the Royal Geographical Society (London). When gold was first found in the Yukon and the rush of settlement began, Ogilvie assisted in the work of political organization, was appointed commissioner of police (1887) and later was Commissioner of the Yukon Territory (1898–1901). He was made chief clerk and astronomer in the Department of the Interior, Ottawa, in 1896. His latest explorations were conducted along the Saskatchewan and Nelson rivers with a view to reclaiming a large area for farming land (1910). His scientific observations concerning the physical geography and products of the explored regions were embodied in valuable reports. After his death was published his *Early Days in the Yukon: The Story of its Gold Finds* (1913).

OGILVIE-GORDON, Mrs. Maria M. (?–). A Scottish geologist, born at Aberdeen. She studied at the Ladies' College, Edinburgh, and at University College, London (1889–90), graduated D.Sc. from London University in 1893, and in 1891–95 attended the University of Munich (Ph.D., 1900). She was married to Dr. John Gordon, of Aberdeen, in 1895, and later took an active part in the work of women's organizations. Her publications include: *The Wengen and Cassian Strata in South Tyrol* (1893); *Coral in the Dolomites* (1894); *The Torsion Structure of the Dolomites* (1898–99); *The Geological Structure of Monzoni and Fassa* (1902–03); *Overthrust Structure in the Langkofl* (1907); *Handbook of Employments* (1908); *The Thrust-Masses in the Western District of the Dolomites* (1910).

OGLESBY, ŏ'g'lz-bĭ, Richard James (1824–99). An American soldier and legislator. He was born in Oldham Co., Ky., was orphaned at eight, studied law while living on a farm and working as a carpenter at Decatur, Ill., and began to practice at Sullivan, Ill., in 1845. He served as a lieutenant in the Mexican War, participating in the battles of Vera Cruz and Cerro Gordo. In 1847 he resumed his law practice at Decatur and after a short course of study graduated at the Louisville Law School in 1848. During the gold excitement of 1849 he crossed the continent to the mining districts of California, but returned to Decatur in 1851. He was an unsuccessful candidate for Congress in 1858, but in 1860 represented his district in the State Senate. When the Civil War broke out, he resigned his seat to accept the position of colonel of the Eighth Illinois Volunteers and subsequently commanded a brigade at Forts Henry and Donelson; was promoted to the rank of brigadier general of volunteers in March, 1862, and to that of major general in November; served under Grant at Shiloh and under Halleck and Rosecrans at Corinth, where he was severely wounded; and commanded the Sixteenth Army Corps from April, 1863, to May, 1864, when he resigned from the service. He was afterward Governor of Illinois (1864–69, 1873, 1884–89) and from 1873 to 1879 was a member of the United States Senate.

OGLETHORPE, ŏ'g'l-thôrp, James Edward (1696–1785). An English general and philanthropist, the founder of Georgia. He was born in London, Dec. 22, 1696, and in 1710 entered the army. In 1722 he entered Parliament as member for Haslemere. The unhappy death of a friend in the debtors' prison drew Oglethorpe's attention to the horrible abuses of that institution. He brought the matter before Parliament and was appointed chairman of a committee to investigate the subject. This experience led to the formation of a plan of colonization as a means of affording relief to insolvent debtors. In 1732 Oglethorpe and others obtained a charter granting them, as trustees, a tract of land in America between the Altamaha and Savannah rivers. The plantation was called Georgia, in honor of George II, who was much interested in the project. Liberal subscriptions were made, and a parliamentary grant of £10,000 was obtained. Oglethorpe was appointed Governor and in November, 1732, sailed with 120 colonists, who founded the town of Savannah (q.v.). Oglethorpe was for nine years the guiding spirit of the settlement. Aside from his administrative activity, his claim to distinction in Colonial history lies in his determined efforts to turn back the Spanish tide of colonization and conquest in the South. In expectation of an attack from the Spaniards at St. Augustine, Oglethorpe organized the defenses of the little Colony, and in 1738 he brought over a volunteer regiment of

600 men recruited in England. Upon the outbreak of the War of Jenkins's Ear in 1739, Oglethorpe successfully repelled an attack on Amelia Island by the Spaniards and in May, 1740, marched against St. Augustine at the head of a force of 2000 militia and Indians, but in spite of the coöperation of a small fleet he was forced to abandon the attempt. In the spring of 1742 a threatened invasion of Georgia by a large Spanish force was repelled by Oglethorpe, who inflicted a severe defeat on the enemy at Frederica and thus assured the Colony immunity from attack. In 1743 Oglethorpe was made brigadier general, and in the same year he returned to England, a step rendered necessary by his financial obligations, most of which were incurred in advancing the necessary supplies for the defense of Georgia. During the Stuart invasion of 1745 Oglethorpe was accused by the Duke of Cumberland of failure to overtake the Jacobite fugitives when sent in pursuit of them. He was courtmartialed, but acquitted. In 1752 he and the other trustees of Georgia resigned their charter, and the Colony became a royal province. He retired from public life in 1754—when his borough did not return him to Parliament—and died at Cranham Hall, Essex, July 1, 1785. Consult: Henry Bruce, *Life of General Oglethorpe* (New York, 1890), in "Makers of America Series"; H. C. Cooper, *James Oglethorpe, the Founder of Georgia* (ib., 1904); "Journal of the Earl of Egmont, First President of the Board of Trustees," in *Colonial Records of Georgia*, vol. v (Atlanta, 1908).

OGLETHORPE UNIVERSITY. An institution for higher education founded under the auspices of the Southern Presbyterian church. A university of the same name was in existence in Atlanta, Ga., from 1835 to 1872. It was one of the most famous educational institutions of the South. Among its alumni were governors, theologians, Sidney Lanier the poet; and the famous scientist LeConte taught there. It flourished until the Civil War, when on account of conditions prevailing in the South at that time it was obliged to abandon its work. It was reëstablished after the war, but was obliged to close in 1872. The new Oglethorpe University is intended to be the successor to this institution. An active campaign for funds was carried on in 1913–15, and about $600,000 was raised. It is provided in the charter that no man may be a member of the board of directors who is not a member in good and regular standing of a Presbyterian church.

OGMORE (ŏg′mŏr) **AND GARW** (gär′o͞o). A coal-mining town and urban district in Glamorganshire, Wales, 2½ miles southwest of Bridgend. Of archæological interest in the neighborhood are Ogmore Castle, a Norman ruin; the remains of the twelfth-century fortified priory of Ewenny; and Coity Castle and church. Pop., 1891, 13,800; 1901, 19,912; 1911, 26,741.

O'GOR′MAN, James Aloysius (1860–). An American jurist and politician, born in New York City. He was educated at the College of the City of New York and at the law school of New York University, where he graduated in 1882. Admitted to the bar in the same year, he began the practice of law in the city and, becoming active in Tammany Hall, was judge of the district court (1893–1900) and justice of the Supreme Court (1900–11). In 1911 there occurred a bitter contest in the Democratic Assembly of New York over the election of a Senator to succeed Chauncey M. Depew, the insurgent Democrats endeavoring to prevent the selection of an organization man. O'Gorman was finally mentioned as a compromise candidate and was elected on the sixty-fourth ballot. His election, as against that of Sheehan, was regarded at the time as a blow to machine politics. As Senator, he soon became known as a leader among the Democrats. He was one of the prominent supporters of Woodrow Wilson's candidacy and after Wilson's election was considered one of the spokesmen for the administration, and yet on many important measures he ranged himself against the President. In 1914 he bitterly opposed the repeal of the law granting exemption to American coastwise ships using the Panama Canal, attributing the agitation therefor to British arrogance and rapacity and to the schemings of the railroad interests. He also led the fight of the seven Democrats against the Ship Purchase Bill of 1915. In 1914 he became involved in a controversy with the Secretary of the Treasury, McAdoo, regarding the New York patronage, and he was successful in balking the appointment of men about whom he had not been consulted.

O'GORMAN, Thomas (1843–). An American Roman Catholic bishop, born in Boston. He lived in Chicago and in St. Paul, Minn., until 1853 and for 12 years thereafter studied in France. In 1867 he took a pastoral charge at Rochester, Minn., but left it in 1878 to become a member of the Paulist community in New York City for four years and was then pastor at Faribault, Minn., until 1885. The following year he went to the College of St. Thomas, St. Paul, as professor of dogmatic theology and was the first president of that institution. In 1890–95 he was professor of modern Church history in the Catholic University, Washington, D. C. He received his D.D. degree from the Pope in 1893 and in 1896 was consecrated Bishop of Sioux Falls, S. Dak. His publications include *A History of the Roman Catholic Church in the United States* (1895).

OGOWAI, ō′gō′wä′, or **OGOVÉ,** ō′gō′vä′. The principal river of French Congo, equatorial west Africa (Map: Congo, Belgian, B 3). It rises about 150 miles northwest of Stanley Pool and flows first northwestward through extensive savannas and then westward through a dense forest region, where it leaves the inland plateau in a series of falls and rapids. Finally turning southwestward, it enters the Atlantic Ocean through a large delta in lat. 1° S. It is in flood during March and April and again during October and November. The Ogowai flows through a densely populated country, but, owing to its numerous rapids, its commercial importance is not as great as it was thought to be before its upper course was explored. Its length is over 700 miles, and it is navigable for small steamers a distance of 200 miles from its mouth. Along its banks are a number of European trading stations. It was explored by Paul du Chaillu in 1857–59.

O'GRA′DY, Standish (1846–). An Irish novelist and historian, whose romances of the mythical, legendary, and historical past of Ireland are interesting in themselves and significant also because they acted as a strong stimulus to the Irish Literary Revival. (See Irish Literature, *In English*.) O'Grady was born at Castletown Berehaven, County Cork; was educated at home, in Tipperary, and at

Trinity College, Dublin; and was called to the bar, soon abandoning practice, however, in favor of journalism and literature. His numerous publications include: *Red Hugh's Captivity* (1889); *The Bog of Stars* (1893); *Ulrick the Ready* (1896); *In the Gates of the North* (1901); and the historical works *History of Ireland's Heroic Period* (2 vols., 1878–80), *History of Ireland*, vol. i (1881), and *The Story of Ireland* (1894). With Sir G. Carew he edited *Pacata Hibernia* (1896).

O'GROW'NEY, EUGENE (1863–99). An Irish Gaelic scholar, born at Ballyfallon, County Meath. He entered the Diocesan Seminary of St. Finian's at Navan and while a student in Maynooth College (1882–88) devoted his leisure to the study of Irish history and antiquities. In 1888 he was appointed a curate in the parish of Ballinacarrigy, County Westmeath. In 1890 he became associate editor of the *Gaelic Journal* and in 1891 professor of Irish at Maynooth. Previously to this during vacations he had visited the Aran Islands to learn the folk-tongue Irish and in common with Professors Zimmer and Kuno Meyer did much to establish the reputation of Inis Meadhoin as an Irish summer school. O'Growney was one of the founders of the Gaelic League in 1893 and later was elected to the Royal Irish Academy. Besides publishing many textbooks he contributed to periodicals. In 1894 his health gave way, and he came to America and settled in Arizona. He died at Los Angeles, Cal. Consult O'Farrelly, *Leabhar an Athar Eoghan, the O'Growney Memorial Volume* (Dublin, 1904).

OGSTON, ŏg'ston, SIR ALEXANDER (1844–). A British surgeon. He was born in Edinburgh and studied medicine at Aberdeen (M.D., 1866), Vienna, Prague, and Berlin. Settling in Aberdeen, he was from 1866 to 1873 assistant professor of forensic medicine at the university (his father, Francis Ogston, being professor), in 1874 became lecturer on surgery, and from 1882 to his retirement in 1908 served as regius professor of surgery. He was connected with the Royal Infirmary in various capacities from 1868 to 1898; to Queen Victoria and King Edward VII he was honorary surgeon in Scotland and to George V surgeon in ordinary. Ogston served in the Sudan in 1885 and in South Africa in 1899–1900. He is known in surgery for an operation of knock-knee which consists in separating the internal condyle of the femur, followed by forcible straightening of the limb; for a treatment of flatfoot which aims at ankylosis between the talus and navicular bone by removing the adjacent articular surfaces; and for an operation in frontal-sinus disease. In 1912 he received the K.C.V.O. Among his works are: *Contributions to Medical Science* (1869); *Surgical Papers* (1871); *Medical Training in Aberdeen and in the Scottish Universities* (1877); *Wounds Produced by Small Arm Bullets* (1898); *The Peace Conference and the Dumdum Bullet* (1899).

OGY'GES, or **OGY'GUS** (Lat., from Gk. 'Ωγύγης, *Ōgygēs*, "Ωγυγος, *Ōgygos*). In Theban legend, one of the early kings of Bœotia, the son or grandson of Poseidon. In his reign a great flood took place in Bœotia, which destroyed cities on Lake Copaïs. His name was borne by one of the seven gates of Thebes, near which his grave was said to be. Later systematizing chronicles introduced Ogyges to Athenian legend as King of Eleusis or even first King of Athens, while others transferred him to Egyptian Thebes. Whatever the origin of the name, there is much to show that Ogyges was originally the name in Bœotia of a sea god like Poseidon.

OGYG'IA (Lat., from Gk. 'Ωγυγίη, *Ōgygiē*). In Homer, the mythical island of Calypso (q.v.), where she detained Odysseus. The word is originally an adjective and describes the island as belonging to the sea god Ogyges (q.v.), whether identified with Oceanus or with Poseidon. Later commentators tried to localize the island near Crete or Italy; in Homer its location is wholly indeterminate in the far West.

O'HA'GAN, THOMAS, first BARON (1812–85). An Irish jurist and statesman, born at Belfast. He was called to the Dublin bar in 1836, for the following four years he edited the *Newry Examiner*, and was afterward associated with his friend Daniel O'Connell (q.v.) in lawsuits bearing upon national rights. His defense of the union with England, and his appointment to the Board of National Education (1858) and to the attorney-generalship (1862) cost him the favor of the Patriot party, but, despite opposition, he was sent to Parliament from Tralee in 1863. Five years afterward, under Gladstone, O'Hagan was made Lord Chancellor of Ireland, the first Roman Catholic raised to that office during two centuries. He served until 1874. In 1870 he took his seat in the House of Lords, in 1880 he was made vice chancellor of the Royal University of Ireland, just founded; and the same year Gladstone, on his return to power, called him to resume the lord-chancellorship of Ireland. O'Hagan's health forbade his keeping this post for more than a year, though he had time to make an eloquent appeal for the Irish Land Bill. His *Occasional Papers and Addresses* were published in 1884 and his *Speeches and Arguments* in 1885.

O'HARA, ō-hăr'ȧ, THEODORE (1820–67). An American poet and soldier, born at Danville, Ky. After being educated at Bardstown he studied law, was admitted to the bar, entered the army at the beginning of the Mexican War, and was brevetted major for gallantry. Afterward he practiced law, filibustered in Cuba, performed diplomatic commissions and filled editorial posts, and in the Civil War served as colonel of an Alabama regiment and on staffs. After the war he engaged in the cotton business and, in the event, very unsuccessfully. When he died, his body was removed to Kentucky and buried by the side of the victims of Buena Vista whom he had commemorated in his famous "Bivouac of the Dead," the only one of his occasional poems that keeps his memory fresh. Consult G. W. Ranck, *O'Hara and his Elegies* (Baltimore, 1875).

O'HIGGINS, ō-ē'gēns. An inland province of Chile, bounded by the Province of Colchagua on the south, Santiago on the north and west, and Santiago and Argentina on the east (Map: Chile, E 4). Area, 2342 square miles. The eastern part lies on the slope of the Andes and is very mountainous. In the west the surface is flat and well adapted for grazing, which, together with agriculture, is the chief occupation. Gold and other metals are found in the mountains, and mining has been developed to some extent. Pop., 1895, 85,277; 1907, 92,339; 1912, 95,524. Capital, Rancagua (q.v.).

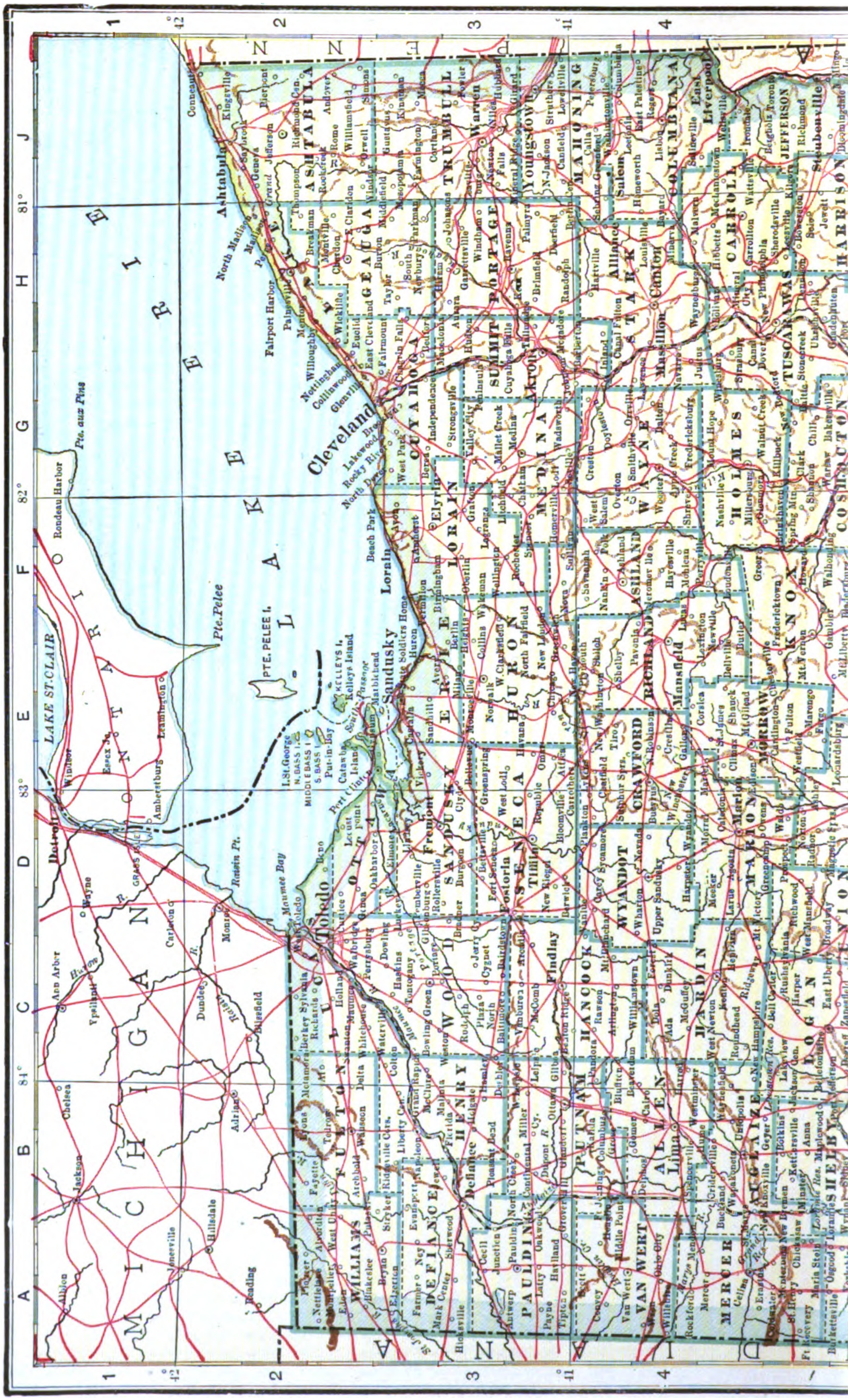
O'HIGGINS, Sp. pron. ō-ē'gēns, AMBROSIO, MARQUIS OF OSORNO (c.1730–1801). A Spanish soldier and administrator, born in County Meath, Ireland. He began studies for the priesthood, then engaged (unsuccessfully) in commercial pursuits in South America, and, finally settling in Chile, entered the army. He was made intendant of Concepción with command of the Araucanian frontier in 1786. Three years later he attained the rank of field marshal and was made Captain General of Chile, in which position he labored to improve the situation of the country. From 1796 to his death he was Viceroy and Captain General of Peru. He placed the viceroyalty in a better state of defense, fostered industries, and carried on numerous public improvements. He was the father of Bernardo O'Higgins. Consult M. de Mendiburu, *Diccionario histórico-biográfico del Perú*, vol. vi (Lima, 1885).

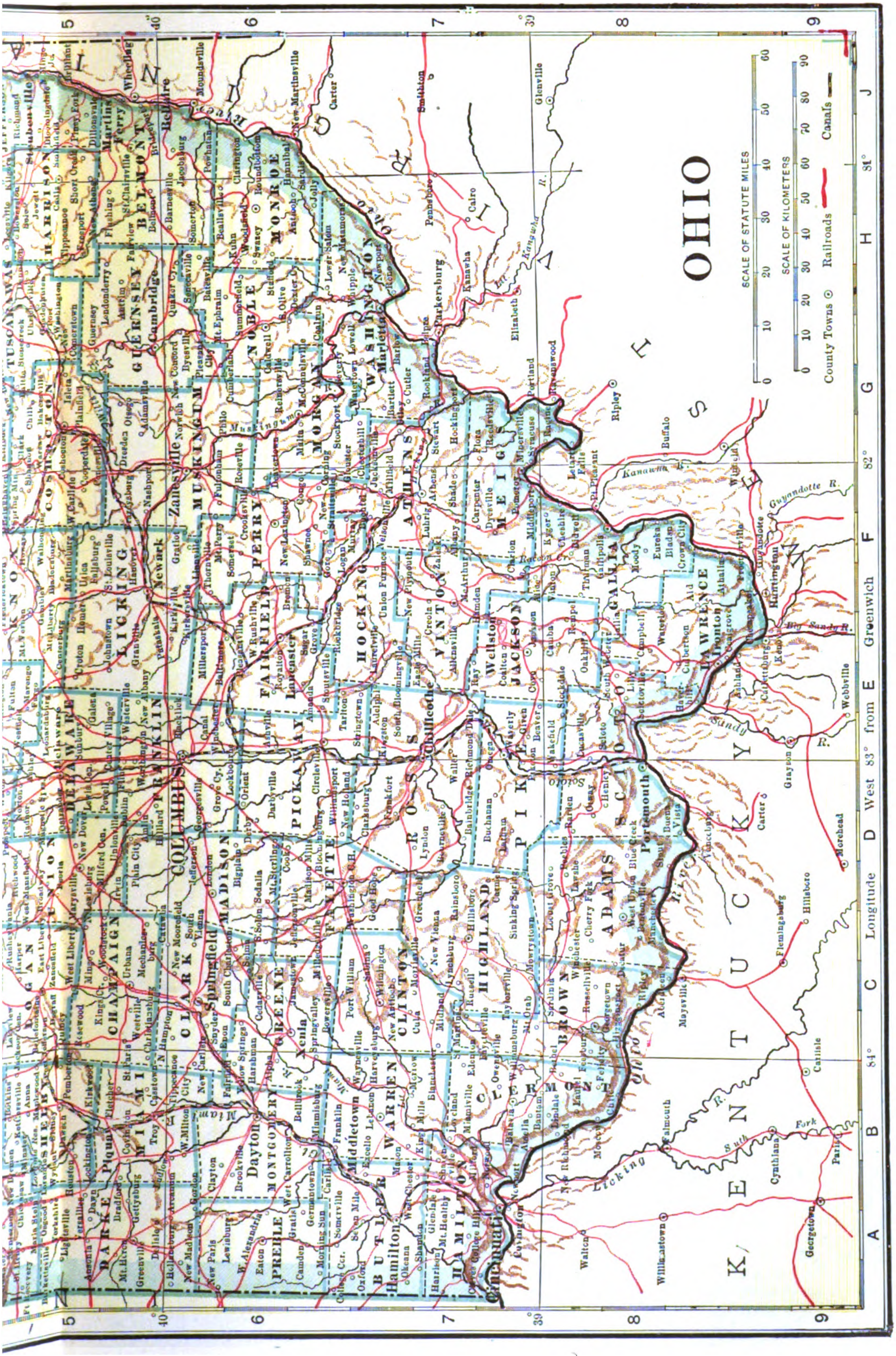
O'HIGGINS, Bernardo (1778–1842). A Chilean soldier and dictator, the son of Ambrosio O'Higgins, born at Chillan. He was educated at Lima and in England, where he became acquainted with Francisco de Miranda (q.v.). Returning to Chile, he took up the life of a rich planter on the parental estates, but in 1810 joined the revolutionary movement and soon became one of its leaders. O'Higgins was a member of the Constituent Congress in 1811 and two years later was appointed commander in chief of the army to succeed José Miguel de Carrera (q.v.). The Treaty of Lircai (May, 1814), which he signed with the Spanish commander, was broken by Carrera and a breach between the two Chilean generals occurred, threatening civil war, but a reconciliation was effected by the necessity of meeting an attack of the Spanish army. The failure of Carrera to send aid having caused the defeat of O'Higgins at Rancagua (1814), he was forced to leave the country, but returned in 1817 as a lieutenant of José de San Martín (q.v.). After the victory of Chacabuco O'Higgins was made Supreme Director of Chile (Feb. 14, 1817) and exercised dictatorial powers. On Feb. 12, 1818, he issued the Chilean declaration of independence, with the date of January 1. In the campaign to drive the Spaniards from Chile he was defeated at Cancha Rayada (March 19, 1818), but was completely successful at Maipo (April 5), the decisive battle of the war. He began the political and administrative reorganization of the country, sanctioned the provisional constitution of 1818, fostered new settlements, and entered into relations with foreign countries. Although opposition to his dictatorship increased, a constituent assembly which he called together in 1822 was completely subservient to his will. The constitution formed by this body was never put into force, because of a revolt which forced the resignation of the dictator (Jan. 28, 1823). O'Higgins went to Lima, where he spent his remaining years. Consult Benjamin Vicuña-Mackenna, *Vida de . . . Don Bernardo O'Higgins* (Santiago, 1882), and A. S. Chisholm, *The Independence of Chile* (Boston, 1911).

OHIO (corruption of Iroquois *Ohionhiio*, beautiful river), popularly called the Buckeye State. A North Central State of the United States lying between lat. 38° 27′ and 41° 57′ N. and long. 80° 34′ and 84° 49′ W. It is bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania, on the southeast by West Virginia, on the southwest by Kentucky, and on the west by Indiana. Its southeastern and southwestern boundaries are formed by the Ohio River, while the others, with the exception of Lake Erie, are straight lines. The State has a maximum measurement of 222 miles from east to west and 210 miles from north to south. Its area is 41,000 square miles, of which 40,740 square miles, or 26,073,600 acres, are land surface. It ranks thirty-fifth in size among the States.

Topography. The surface consists of a plain and low plateau and has an average elevation of about 850 feet. The greatest altitude, 1540 feet, is near Bellefontaine, in the west-central part; the lowest is at the southwest corner, 425 feet (low water at the mouth of the Miami). With respect to relief the State is divided into three parts. A strip along the northern border, 5 miles wide on the east and increasing to 70 miles at the west, is old lake bottom and nearly flat. South of this strip the State is divided into two parts by a line passing south-southwest near Mansfield, Newark, and Chillicothe. The part west of this line consists of nearly level or mildly rolling glacial plains incised by larger streams to a depth of several hundred feet. The eastern half belongs to the Alleghany plateau, not glaciated except in its northern part. Where unglaciated (i.e., south of lat. 41° 45′) this plateau is a hilly country with local relief ranging from 100 feet on the west to 500 feet in the bluffs of the Ohio. Much the larger part of the drainage is into the Ohio by the Muskingum, Scioto, and Miami systems. The Ohio borders the State for 448 miles, running between bluffs 300 to 600 feet high and ½ mile to 2 miles apart. The chief stream of the Erie basin is the Maumee, which drains the western end of the old lake flat.

Geology. The underlying rocks of Ohio range in age from Ordovician to Permian. Except in rare instances they are so nearly horizontal that the eye cannot detect a dip. The geologic map, however, shows that the oldest rocks outcrop in the southwest corner, indicating a slight upward bulge or dome (the Cincinnati anticline) planed off by erosion. Here and in adjacent parts of Kentucky and Indiana are found the rocks of the Ordovician system, largely limestone and shale. An extension of this gentle uplift passes to the north and west over Indiana. A branch of the same uplift also extends north by east to the west end of Lake Erie. It brings the Silurian rocks to the surface along this line. From this axis the strata dip gently northwest towards the synclinal basin of Michigan and southwest towards the shallow syncline of the Alleghany plateau. Successively younger and younger rocks appear at the surface as the distance from this axis increases. Going northwest, strips of Devonian and Mississippian (Lower Carboniferous) are crossed before reaching the Pennsylvanian coal measures (Upper Carboniferous) in Michigan. Going east and southeast the outcrops of Devonian, Mississippian, Pennsylvanian, and Permian are crossed or reached before coming to the Ohio. The Erie basin is sufficiently deep to expose above its water level a narrow strip of Devonian. The outcrops of the several systems named are therefore crossed in going south from the east end of Lake Erie. The Carboniferous, outcropping in eastern Ohio, is relatively poor in limestone, while the older systems are rich in limestone. This fact has been expressed very roughly by speaking of Ohio as consisting of an eastern or sandstone half and a western or lime-


LAKE ERIE
MICHIGAN
ONTARIO
LAKE ST. CLAIR
Detroit
Windsor
Ann Arbor
Ypsilanti
Jackson
Adrian
Hillsdale
Monroe
Toledo
Sandusky
Lorain
Cleveland
Ashtabula
Conneaut
Painesville
Fairport Harbor
Elyria
Akron
Canton
Massillon
Youngstown
Warren
Alliance
Salem
Mansfield
Findlay
Lima
Tiffin
Fostoria
Fremont
Wooster
Marion
Steubenville
Pte. Pelee
Rondeau Harbor
Pte. aux Pins
PTE. PELEE I.
KELLEYS I.
Kelleys Island
Put-in-Bay
Maumee Bay
WILLIAMS
FULTON
LUCAS
OTTAWA
DEFIANCE
HENRY
WOOD
SANDUSKY
ERIE
HURON
LORAIN
CUYAHOGA
LAKE
GEAUGA
ASHTABULA
TRUMBULL
PORTAGE
SUMMIT
MEDINA
WAYNE
STARK
MAHONING
COLUMBIANA
CARROLL
JEFFERSON
HARRISON
TUSCARAWAS
HOLMES
COSHOCTON
KNOX
ASHLAND
RICHLAND
CRAWFORD
MORROW
MARION
WYANDOT
SENECA
HANCOCK
PUTNAM
PAULDING
VAN WERT
ALLEN
HARDIN
AUGLAIZE
MERCER
SHELBY
LOGAN
UNION
DELAWARE
A B C D E F G H J
1 2 3 4
84° 83° 82° 81°
42° 41°


OHIO
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90
County Towns ⊙
Railroads
Canals
Longitude West 83° from Greenwich
A B C D E F G H J
5 6 7 8 9
84° 82° 81°
39 40
KENTUCKY
WEST VIRGINIA
INDIANA
COLUMBUS
Ohio R.

stone half. This division approximates that made above under *Topography*, but is less accurate. The contrast is, however, valuable in a discussion of soils. Resting on these consolidated strata, except in southeast Ohio, are unconsolidated deposits, ranging in thickness from zero to several hundred feet, due directly or indirectly to the presence of former continental ice sheets. These are bowlder clay or till, brought to its place and deposited by the ice, and sand, gravel, and clay deposits by waters issuing from the ice sheets. The southwest corner is covered by a loesslike (probably wind-blown) deposit; the lake flat on the north has some lacustrine deposits. Old beach ridges mark the successive stages of the glacial lake which occupied the Erie basin.

Climate. Except as modified in the northern part by the influence of Lake Erie, Ohio has a climate which is typical of open plains far from the sea in middle latitudes. The mean annual temperature is 50.9° F., the southern third being 4° F. warmer than the northern. The average July temperature for 26 years has been 73.1° F., the average February temperature 27.9°, a range of 45.2° F.; this range is least on the shore of Lake Erie. The average daily range reaches 26° F. in certain places along the Ohio and is but 15° F. on the lake shore. The average annual precipitation for the State is 38.4 inches, being least in the northwest (30.8 inches at Toledo) and greatest in the southeast (42.1 inches at Marietta). The amount of this which falls in the form of snow varies from nearly 4 feet near Lake Erie to less than 18 inches in the southwestern part. The distribution of precipitation throughout the year is fairly uniform.

Soils and Vegetation. The soils of Ohio must be considered in terms of the physical divisions mentioned above under *Topography*. Those of the southeastern portion in the unglaciated part of the Alleghany plateau result from the decay of the underlying rocks, which yield a less fertile soil than do the glacial formations. Moreover, the topography of this portion is less favorable to agriculture. West and northeast Ohio have soils derived from the glacial drift, which was itself derived in large part from rocks rich in lime. Agriculturally these are part of the great upper Mississippi valley. Parts of it were originally swampy, particularly a large area southeast of the Maumee called by early settlers the Great Black Swamp. Most of Ohio was originally covered with forests of oak, maple, hickory, elm, beech, ash, and other hardwoods.

For fauna, see under UNITED STATES.

Mining. Including the value of the pig iron produced Ohio ranked second among the States in 1913 as a producer of minerals. Eliminating this as a product of imported raw material, it held fourth place, its true position in the list. Coal and clay products have alternated in holding first place in the value of products. In 1913 coal was the ranking mineral, with a production of 36,200,627 short tons, valued at $39,948,058, the record production up to that year. The coal is a bituminous variety, though some of it can be used as a blast-furnace coal when mixed with coke. Most of the coal is obtained from the eastern half of the State, which contains an important part of the Appalachian coal field. More coal is mined by machines than in any other State. In 1913, 32,642,848 tons, or 90.2 per cent of the total production, were machine mined. The total number of men engaged in the coal mines was 45,815. Comparatively little of the coal product of Ohio is washed.

Ohio ranks first in the production of clay products. In 1913 the total value of this was $38,388,296, of which the value of the brick and tile products amounted to $21,868,407. The principal clay-working counties are, in the order of their importance, Columbiana, Muskingum, Summit, Jefferson, Mahoning, Perry, Stark, Cuyahoga, Tuscarawas, and Carroll. Sewer pipe represents the largest value of the products of the brick and tile industry, with vitrified brick second, tile other than drain third, and common brick fourth. The pottery industry is made up largely of the manufacture of high-grade pottery wares, most of the plants being along the Ohio River, chiefly at East Liverpool and vicinity. Over 60 per cent of the total production of pottery in Ohio was white ware. The production of petroleum ranks third among the mineral industries. Ohio ranked sixth in 1913 among the petroleum-producing States, the product coming chiefly from the Ordovician rocks, deep below the surface, in the northwestern part, and partly from the Silurian, Devonian, and Carboniferous rocks, in the eastern half. The production in 1913 amounted to 8,781,468 barrels, valued at $17,538,452. The production of natural gas in 1913 was valued at $10,416,699, and ranked fourth among the mineral industries. Quarrying, fifth among the mining industries, consists chiefly in the production of limestone. The total value of the stone produced in 1913 was $6,261,338. The State is second in the production of pig iron, which is not included in the total value of its mineral products. The pig-iron production in 1913 amounted to 6,913,961 tons, valued at $103,824,517. Coke is also made in large quantities. The production in 1913 was 351,846 tons, valued at $1,231,554. Other mineral products whose total value exceeded $1,000,000 in 1913 are sand and gravel, salt and cement. In the production of molding sand Ohio ranks first among the States, and it is second in the production of bromine and lime and third in the value of calcium chloride and gypsum. Other commercial mineral products are mineral waters, pyrite as a by-product of coal mining, sand-lime brick, and sulphuric acid from zinc smelting. The total value of mineral products was $121,690,661 in 1913.

Agriculture. Of an approximate land area of 26,073,600 acres 24,105,708 acres, or over 90 per cent, were in farms in 1910. The total number of farms was 272,045, and the improved land in farms amounted to 19,227,969 acres. The average acres per farm were 88.6, and the total value of farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $1,902,694,589. Nearly one-third of the farms in Ohio contained from 50 to 99 acres and approximately one-fourth contained from 100 to 174 acres. Of the total number of farms in 1910, 194,857 were operated by owners and managers and 77,183 by tenants. The native white farmers numbered 252,645, the foreign-born white farmers 17,450, and the negro and other nonwhite farmers 1950. Of the foreign-born white farmers 9872 were born in Germany, 1869 in England, 1256 in Switzerland, 1019 in Ireland.

The table on page 388 gives the acreage, production, and value of important crops as estimated for 1914 by the United States Department of Agriculture.

CROPS	Acreage	Prod. bu.	Value
Corn	3,650,000	142,715,000	$87,056,000
Wheat	1,975,000	34,538,000	38,365,000
Oats	1,650,000	59,325,000	22,646,000
Rye	95,000	1,615,000	1,308,070
Potatoes	150,000	14,250,000	7,552,000
Hay	2,812,000	*3,178,000	42,585,000
Tobacco	86,800	†78,120,000	6,875,000
Sugar beets	17,800	‡21,425	§ ....

* Tons. † Pounds. ‡ Short tons of sugar made.
§ No estimate of value.

The total value of the crops in 1909 was $230,338,000 and the combined acreage was 11,431,610. The leading crops in the order of their importance are corn, hay and forage, wheat, oats, potatoes, and tobacco. Three-fifths of the total value of crops in 1909 was contributed by the cereals. Corn, by far the most important of the crops, had in 1909 an acreage of 3,916,050; the production amounted to 157,513,300 bushels, valued at $82,327,269. Hay and forage had an acreage of 3,306,461. The production amounted to 4,521,409 tons, valued at $42,357,364. Wheat had an acreage of 1,827,932 in 1909, the production amounting to 30,663,704 bushels, valued at $31,112,975. Oats ranks third in importance of the cereal crops and had an acreage in 1909 of 1,787,496. There were produced, in 1909, 57,591,046 bushels, valued at $23,212,352. Ohio is a large producer of Irish potatoes. This crop in 1909 had an acreage of 212,808, producing 20,322,984 bushels, valued at $9,377,955. Tobacco had an acreage of 106,477 and a production of 88,603,308 pounds, valued at $8,998,887. The total crop of potatoes and other vegetables that year had an acreage of 337,422 and a production valued at $20,875,927. Excluding potatoes, sweet potatoes, and yams, the acreage of vegetables was 123,461, valued at $11,394,000. Ohio is an important producer of orchard fruit. In 1910, 14,933,813 fruit trees produced 6,711,208 bushels, valued at $5,691,530. The most important is the apple. of which 4,663,752 bushels, valued at $2,970,851, were grown in 1909. Next in value were peaches and nectarines, of which there were grown in the same year 1,036,340 bushels, worth $1,349,311. The grape production in 1909 was 43,933,207 pounds, valued at $858,594. The most important of the small fruits is strawberries, of which 8,501,065 quarts, valued at $677,767, were grown in 1909. The total production of small fruits was 15,721,023 quarts, valued at $1,296,343. In 1909 were grown 63,696 tons of sugar beets, valued at $319,667, and 28,644 tons of sorghum cane.

Live Stock and Dairy Products. The value of the domestic animals of all kinds on farms in 1910 was $187,523,324. On Jan. 1, 1915, the estimated number of cattle other than milch cows was 838,000, valued at $28,995,000; milch cows, 895,000, valued at $53,700,000; horses, 910,000, valued at $116,480,000; mules, 24,000, valued at $3,048,000; sheep, 3,263,000, valued at $15,336,000; swine, 3,640,000, valued at $40,768,000. The State is noted for its sheep raising. For many years it was first in the number of sheep, but is now surpassed by Wyoming and Montana. The total value of milk, cream, and butter fat sold and butter and cheese made in 1909 was $30,869,408. The milk sold amounted to 99,430,948 gallons, valued at $13,025,828, and the butter made to 63,569,123 pounds, valued at $14,305,607. The total number of fowls on farms was 17,342,289, valued at $9,532,672. The production of eggs was 96,259,005 dozen, valued at $18,842,241.

Forest Products. The total amount of rough lumber cut in 1909 was 542,904 M feet; 17,508 thousands of lath and 3227 thousands of shingles were made. In the production of hardwood lumber in 1909 Ohio ranked third among the States, and in cut of walnut first. Oak formed 47.8 per cent of the total output in that year. Other hardwoods cut in considerable quantities are beech, maple, yellow poplar, elm, ash, and hickory. In 1913 there were sawed 414,943 M feet board measure. The total number of active mills reporting in that year was 826. In addition to the figures above there were produced on farms in 1909 forest products valued at $5,761,941. Ohio leads in maple-sugar products. In 1909 the output was valued at $1,099,248.

Manufactures. Ohio is important because of its mining and agricultural activities, but is principally a manufacturing State. Its many natural resources and its position on important waterways have been the main reasons for its rapid growth and its early ranking as one of the most important producers of manufactured products, in the value of which it ranked fifth in 1909. The production per capita in that year was $302. The table (p. 389) gives the most important figures as to manufactures for 1904 and 1909.

There were, in 1909, 90 industries or industry groups which had a product in excess of $500,000 in value and 8 with a product between $25,000,000 and $50,000,000 in value. The most important industry of Ohio is the manufacture of iron and steel, steel works, and rolling mills. The foundry and machine-shop products ranked second in value and products of iron and steel blast furnaces third. Owing to its location midway between the largest iron-ore and coking-coal deposits in the country, to a plentiful supply of natural gas and oil, and to most excellent transportation facilities, Ohio in 1909 ranked second in the iron and steel output, Pennsylvania alone having a greater production. The value of the output of steel works and rolling mills represented 13.8 per cent of the total value of the manufactured products. Included in the iron and steel industry is the manufacture of tin plate and terneplate, in which manufacture the State ranks third. There were produced in the iron and steel mills, in 1909, 5,898,690 tons of rolled, forged, and other classified products. The steel production was 4,705,337 tons, of which 3,337,895 were Bessemer steel. The production of pig iron in 1909 was 5,446,971 tons, valued at $82,048,712. Next after the iron and steel industries comes the slaughtering and meat-packing industry. The earliest packing houses were flatboats on the Ohio River, and as early as 1803 beef and pork were shipped from Cincinnati to New Orleans. The pioneer establishment of the western packing industry, as now understood, was founded in Cincinnati about 1818. This city has long been the centre of the slaughtering and meat-packing industry in Ohio. There were slaughtered, in 1909, 265,191 beeves, 150,223 calves, 229,985 sheep, and 1,725,285 hogs. The flour and grist milling is one of the oldest industries, flour having been sent to New Orleans as early as 1803. Owing to the large quantities of cereals raised in Ohio and its nearness to the other great grain-growing States, this industry has retained its prominence. In 1909 Ohio ranked second among the States in the manufacture of automobiles. In that year the total number manufactured was 14,299, valued at $23,550,112. The manufacture of distilled, malt, and vinous liquors forms an important group of manufactures. Of the three industries the manufacture of malt liquors was by far the most important. For details in regard to the clay products, in which Ohio ranks first, see *Mining*, above. Ohio ranked fifth in 1909 in tobacco manufactures, third in the manufacture of soap, sixth in the manufacture of paper and wood pulp, second in the manufacture of glass, first in the manufacture of carriages and wagons.

SUMMARY OF MANUFACTURES FOR 1904 AND 1909

THE STATE — FIFTEEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	15,138	523,004	446,934	$1,300,733	$245,450	$1,437,936	$613,734
	1904	13,785	417,946	364,298	856,989	182,429	960,812	483,175
Automobiles, including bodies and parts.	1909	75	13,458	12,130	30,892	7,746	38,839	20,317
	1904	22	2,939	2,722	4,226	1,617	6,358	3,805
Boots and shoes, including cut stock and findings.	1909	72	17,607	16,026	16,755	6,646	31,551	12,679
	1904	73	15,091	14,032	10,434	5,275	25,735	10,746
Bread and other bakery products	1909	1,467	8,758	5,972	11.781	3,371	23,007	9,341
	1904	1,138	7,097	5,295	8,320	2,520	15,641	6.582
Carriages and wagons and materials	1909	407	10,350	8,815	20,398	4,647	21,949	10.535
	1904	456	12,555	11,027	19,295	5,269	24,003	11,147
Cars and general shop construction and repairs by steam railroad companies	1909	71	22,102	20,728	10,654	12,726	28,690	14,424
	1904	74	18,195	17,026	7,503	9,890	21,428	11,203
Clothing, men's, including shirts	1909	342	11,813	9,950	14,432	4,050	24,869	11,949
	1904	357	8,590	7,185	12,263	2,749	19,346	9,409
Flour-mill and gristmill products	1909	673	4,164	2,585	19,963	1,415	48,093	6,740
	1904	694	4,141	2,700	14,931	1,340	49,856	5,230
Foundry and machine-shop products.	1909	1,218	74,887	64,817	177,745	38,015	145,837	81,277
	1904	1,003	59,791	52,986	117,449	28,207	103,713	59,167
Iron and steel, blast furnaces	1909	40	8,278	7,295	94,533	5,090	83,699	15,274
	1904	33	5,829	5,434	43,196	3,471	40,862	8,385
Iron and steel, steel works and rolling mills.	1909	75	41,912	38,586	163,384	28,614	197,780	58,537
	1904	57	29,500	27.756	87,406	18,658	111,997	33,787
Liquors, malt	1909	105	5,275	4,356	57,748	3,267	25,332	18,769
	1904	114	4,540	3,771	34,970	2,802	21,621	15,665
Lumber and timber products	1909	1,390	16,445	13,456	28,500	6,701	34,597	14,625
	1904	1,312	16,380	13,570	24,631	6,594	32,926	15,193
Printing and publishing	1909	1,653	22,751	15,756	38,053	9,355	41,657	29,753
	1904	1,542	19,288	13,859	26,724	7,573	31,327	22,648
Slaughtering and meat packing	1909	158	3,864	3,086	12,399	1,857	50,804	6,457
	1904	105	2,750	2,315	6,465	1,355	29,155	3,844
Tobacco manufactures	1909	1,146	14,681	12,631	11,070	4,505	28,907	16,832
	1904	1,329	13,280	11,175	15,647	3,912	20,489	12,989

The total number of wage earners in 1909 was 446,934, of whom 375,369 were males. Wage earners under 16 years of age numbered 5244, of whom 2675 were males. The prevailing hours of labor for the great majority of wage earners in 1909 was from 54 to 60 a week.

There were 37 cities with a population of 10,000 or over in 1910. These cities contained 72.4 per cent of the average number of wage earners and produced 74.9 per cent of the total value of the manufactures. The most important manufacturing city is Cleveland, which in 1909 had 84,728 wage earners and manufactured products valued at $271,960,823. Ranked by value of products it was fifth among the cities of the United States in 1909. The most important industrial establishments of this city are steel works and rolling mills, foundries, machine shops, and manufactories of automobiles. Cincinnati ranks second as a large manufacturing centre. There were in this city, in 1909, 60,192 wage earners, with a product valued at $194,515,692. Its leading industries are slaughtering and meat packing, foundries and machine shops. Youngstown ranks third in the value of manufactured products, but is surpassed by four other cities in the number of wage earners. The total value of the manufactured products of Youngstown in 1909 was $81,270,747. The most important products are steel, in the manufacture of which the city outranks all others in the State, the products of the blast furnaces, foundries and machine shops, and the planing mills. Other cities whose manufactured product in 1909 exceeded $10,000,000 were Akron, Toledo, Dayton, Columbus, Lorain, Canton, Steubenville, Springfield, Hamilton, Middletown, and Bellaire. In Akron the manufacture of rubber goods (mostly tires) leads all others by far. It is the most prominent centre of that industry in the United States. Toledo has a comparatively wide range of industries, among which are foundries and machine shops, the roasting and grinding of coffee, flour-mill and gristmill products, blast furnaces, manufactures of automobiles, and petroleum refining. The distinctive industry of Dayton is the manufacture of cash registers and calculating machines, in which it outranks all other cities in the United States. The leading industry in Columbus is the manufacture of foundry and machine-shop products; in Lorain, the manufacture of steel; in Canton, steel works and rolling mills. See also under these cities.

Transportation. Ohio enjoys almost unsurpassed transportation facilities; both in total mileage and in the average mileage per square mile the State takes high rank. The total steam-railroad mileage of main track in 1914 was 9232. The principal roads with their mileage of main track are: the New York Central lines, including the Cleveland, Cincinnati, Chicago, and St. Louis (487), the Toledo and Ohio Central (395), the Lake Shore and Michigan Southern (383), the New York, Chicago, and St. Louis (269); the Pennsylvania lines, including the Toledo, Columbus, and Ohio River (337), the Pittsburgh, Cincinnati, Chicago, and St. Louis (336), the Cleveland, Akron, and Cincinnati (326), the Pittsburgh, Fort Wayne, and Chicago (252); the Baltimore and Ohio lines, including the Baltimore and Ohio Southwestern (307), the Cleveland, Lorain, and Wheeling (191); the Wheeling and Lake Erie (469); the Detroit, Toledo, and Ironton (331); the Hocking Valley (321); the Cincinnati, Hamilton, and Dayton (315); the Norfolk and Western (264); the Wabash (165).

In addition to these figures Ohio has a total of 2200 miles of single track of interurban electric railroads connecting various important centres. The total mileage of single track of street and suburban railways in 1914 was 632. Water communication on the north is furnished by Lake Erie, through which Ohio has outlets both to the Atlantic coast by way of the Erie Canal and to the northwest States by means of the Great Lakes and the Sault Ste. Marie Canal. The Ohio River on its southern boundary and its chief tributary, the Muskingum, afford water routes to Pennsylvania and the States of the Mississippi valley. Two canals connecting the Ohio with Lake Erie complete the network of waterways. They extend from Cleveland to Portsmouth and from Toledo to Cincinnati. Toledo, Sandusky, and Cleveland on the lake and Cincinnati, Columbus, and Dayton on the river are all ports of entry for foreign commerce.

Banking. In 1803 a trading company was chartered with the privilege of doing a banking business. From 1808 to 1813 five more banks were incorporated, each by a special act of the Legislature. The banks did a prosperous business, and when in 1817 a branch of the first United States Bank was established in Cincinnati it called forth strong opposition. The State made an effort to drive out this branch by special taxation, but was defeated in the United States Supreme Court. Some 25 banks were established in the following 20 years, and when in 1836 the second United States Bank made an effort to establish a branch, a special act was passed prohibiting it. A large number of unauthorized banking institutions sprang up between 1840 and 1850 and their currency flooded the State. Several of them failed and caused losses to the holders of currency. To correct the evil the State in 1845 strictly prohibited any one from engaging in the banking business without special authority of the State; but the law did not prove sufficient, and in 1851 the State was forced to pass a free banking law. In 1863 almost all the State banks became national. Since then the national banks have remained the more popular. In the panics of 1873, 1884, and 1893 the numerous bank failures were practically limited to the private and State banks. A reaction in favor of State banks came towards 1900, when the high prices of the United States bonds made the advantages of national banking unattractive. Savings banks have existed in Ohio since 1850, but the institutions do also a commercial business and their figures, excepting the mutual savings banks, are included with those of State banks.

The condition of the various banks in 1914 is shown in the following table:

	National banks	State banks *	Trust companies	Private banks	Mutual savings banks
Number	377	480	66	196	3
Capital	$62,029,000	$20,554,000	$24,930,000	$2,825,000	....
Surplus	32,735,000	8,296,000	17,132,000	878,000	$4,176,000
Cash, etc.	36,252,000	8,280,000	10,356,000	1,429,000	1,748,000
Deposits	330,337,000	180,650,000	274,472,000	31,253,000	5,394,000
Loans	326,122,000	143,325,000	177,848,000	26,372,000	20,549,000

* Includes savings banks other than mutual.

Government. Ohio is governed under a constitution formulated in 1852 and amended in 1875, 1883, 1885, 1902, 1903, 1905, and 1912. An amendment may originate in either branch of the General Assembly or among the people, but in order to become effective must be adopted by three-fifths of the members of each House and by a majority of the voters. To call a constitutional convention an affirmative vote of two-thirds of each of the legislative Houses and a majority of the electors is necessary. At the general election to be held in 1932, and every twentieth year thereafter, the question shall be submitted, "Shall there be a convention to revise, alter, or amend the constitution?" The seat of government is at Columbus.

Legislative.—The Legislature, consisting of a Senate and a House of Representatives, meets biennially, the regular sessions beginning on the Tuesday next following the first Monday in April in odd years. The initiative and referendum has been adopted and is in full force. The Senate is composed of 33 and the House of 123 members. Both branches are elected biennally.

Executive.—The executive department consists of the Governor, Lieutenant Governor, Secretary of State, Auditor, Treasurer, and Attorney-General. They are elected on the first Tuesday after the first Monday in November in even years, and with the exception of the Auditor, whose term is four years, hold office for two years. The Governor may convene the General Assembly on extraordinary occasions. No other business but that upon which the session is called may be transacted.

Judiciary.—The judicial power is vested in the supreme court, courts of appeal, courts of common pleas, courts of probate, and such other inferior courts as may be established by law. The supreme court consists of a Chief Justice and six judges. These judges are elected for a term of not less than six years. The State is divided into appellate districts bounded by county lines. In each of these there is a court of appeals consisting of three judges. The court must hold at least one court annually in each district. Justices of the peace are elected and hold office for six years. In every county the people elect a resident judge of the court of common pleas. There is also in every county a probate court. By vote of the electors the probate court may be combined with the court of common pleas.

Suffrage and Elections.—Every male citizen of the United States 21 years of age or over who has been a resident of the State for one year, of the county for 30 days, and of the township, village, and ward for 20 days next preceding the election, is entitled to vote. Elections for State officers are held on the Tuesday next after the first Monday in November in the odd years. All nominations for elective State, district, county, and municipal offices must be made at direct-primary elections or by petition. A provision is made for a preferential vote for President and United States Senator. Direct primaries are not held for the nomination of township officers or for the officers of municipalities of less than 2000 population, unless petitioned for by a majority of the electors of such township or municipality. Registration is made annually in cities having a population of 100,000 or more; in cities which have a population of 11,800 and less than 100,000 such registrations are made every four years. At the primary election to be held at the last Tuesday in April, 1916, and in every fourth year following, delegates and alternates to the national conventions of the different parties are chosen by the direct vote of the electors.

Local and Municipal Government.—Municipal corporations having a population of 5000 or over are termed cities; all others are villages. Municipalities may acquire, construct, own, lease, and operate public utilities. Any municipality may frame and adopt or amend a charter for its government. Under the Municipal Charter Act all laws pertaining to the initiative and referendum in municipalities apply to it and become a part of each plan of government. Provision is also made for the recall of any elective official by the qualified voters.

Miscellaneous Constitutional and Statutory Provisions.—In civil cases verdict may be rendered by the concurrence of not less than three-fourths of the jury. There is a bureau of vital statistics which provides for the registration of all births and deaths. Capital punishment was abolished by the Constitutional Convention of 1912. There is also provision for mothers' pensions. Municipal corporations are authorized to limit the number of saloons.

Finances. The first debt of the State was created in 1825, when the construction of several important canals was begun. In 1835 the debt amounted to $4,500,000. The State continued to subscribe to railroad, turnpike, and canal companies, until in 1843 it had a public debt of $16,880,000, in 6 and 7 per cent bonds and interest charges of $1,022,000. Simultaneously with the loans the State established a system of taxation to meet the charges. All the income from the canals and a special tax were pledged for that purpose. These measures kept the credit of Ohio high and enabled it to borrow further sums. In the financial stringency of 1838–40, however, borrowing became more difficult, and as the abandonment of work would have meant too great a loss, 7 per cent bonds had to be issued in 1843. But the law authorizing this loan also closed up all means of further increase of the debt. The sinking fund, the proceeds from sale of lands, and the school fund were absorbed by the canals. The debt was then gradually reduced and in 1856 it was $13,897,242. During that year, however, $2,423,349 more was borrowed, after which the debt was rapidly reduced. In 1880 the debt was only $6,476,805, the greater part of which was acquired by the school fund and so became irredeemable. Of the redeemable debt only $2,541,655 was left in 1890 and in 1902 only $200,000, maturing in 1903. The United States Census Office states that the only bonded debt of the State in 1912 was $1665, and that the funded debt, $5,256,836, was chiefly nonnegotiable obligations to public trust funds. The income of the State was always derived mainly from direct taxation and was divided between the general revenue fund, sinking fund, and school fund. In 1892 a special university fund was created. In 1914 the total income was $20,544,139 and the disbursements $18,270,139.

Militia. The males of militia age in 1910 numbered 1,076,928. The organized militia on Jan. 4, 1914, included 5637 enlisted men and 490 officers. It comprised two brigades of infantry of three regiments each, two additional regiments of infantry, a squadron of cavalry, a battalion of engineers, a battalion of signal corps, two companies of sanitary troops, and two field hospitals.

Population. Ohio ranked fourth in population in 1909. The population at each Federal census since 1800 was as follows: 1800, 45,365; 1810, 230,760; 1820, 581,434; 1830, 937,903; 1840, 1,519,467; 1850, 1,980,329; 1860, 2,339,511; 1870, 2,665,260; 1880, 3,198,062; 1890, 3,672,329; 1900, 4,157,545; 1910, 4,767,121. The estimated population for 1915 was 5,088,627. The urban population (places of 2500 or more) numbered 2,665,143. It is worthy of note that Ohio in spite of its highly developed manufacturing industries has a rural population almost as large as its urban population. Native whites numbered 4,057,652, foreign-born whites 597,245, and negroes 111,452. Of the foreign-born 29.3 per cent, more than twice as many as from any other country, came from Germany, while 14.4 per cent were from Hungary and 12.2 from Austria. Of the natives 85.1 per cent were born in the State. Pennsylvania contributed 3.5 per cent of those born in other States, Kentucky 2 per cent, and Indiana 1.6 per cent. By sex the population was divided into 2,434,758 males and 2,332,363 females. In the same year there were 1,484,265 males of the age of 21 or more. In 1910 there were eight cities with more than 50,000 inhabitants each. These with their populations for 1910 and 1914 (estimated) follow: Cleveland, 560,663 and 639,431; Cincinnati, 363,591 and 402,175; Columbus, 181,511 and 204,567; Toledo, 168,497 and 184,126; Dayton, 116,577 and 123,794; Youngstown, 79,066 and 93,341; Akron, 69,067 and 80,291; Canton, 50,217 and 57,426.

Education. On its admission as a State in 1802 Congress gave to Ohio for the support of its schools the sixteenth section of each township. The first public-school law was passed in 1821, but this proved inadequate and another was enacted in 1823. The common-school fund was established in 1827. The first common-school law was enacted in 1889. It has been amended in important details, especially in 1902, when a measure was passed standardizing the school system, providing for three grades of high schools and amending the compulsory-school law and the child-labor law. The Legislature in 1914, as a result of an investigation by a special commission, passed several important measures relating to schools. It provided, among other things, standards for consolidated elementary schools and made provisions for additional State aid for grading schools. In Ohio the real school authority rests with the school districts. There is a State Commissioner of Education, who has general supervision over the administration of the schools and the enforcement of the laws, and there are city, village, township, and special boards of education. There are also State, county, and city boards of examiners. The commission has the power to appoint two high-school inspectors and four district supervisors of agriculture.

There were, in 1910, 124,774 illiterates of 10 years of age or over. This was 3.2 per cent of the entire population. The illiterates of native white parentage numbered 39,807, or 1.7 per cent; foreign-born white illiterates numbered 66,887, or 11.5 per cent; and illiterates among the negroes numbered 10,460, or 17.8 per cent. The total school population (6 to 20 years) in 1910 according to the thirteenth census was 1,313,809, of which 868,575 attended school. According to the report of the Commissioner of Education the total school population in August, 1914, was 1,274,242, the total enrollment was 895,167, and the average daily attendance was 720,440. The total number of teachers was 30,258, of whom 8185 were men and 22,173 were women. The average yearly salary of teachers was $527. The total expenditures for school purposes in 1914 was $36,455,374. The State regularly appropriates for educational purposes $2 for each person from 6 to 21 years of age.

Agricultural education is provided in high schools, and in several of the larger cities are training schools for teachers. There are seven normal schools, the Perkins Normal School at Akron, State Normal School at Athens, the Cleveland Normal Training School at Cleveland, the Columbus Normal School at Columbus, the Dayton Normal School at Dayton, the State Normal School at Oxford, and the Toledo Normal Training School at Toledo. There are an unusually large number of institutions of collegiate rank. The Ohio State University at Columbus, a part of the educational system of the State, the Ohio University at Athens, and Miami University at Oxford are all supported by the State. Other important institutions are the Northern University at Ada, University of Akron at Akron, Western Reserve University at Cleveland, Ohio Wesleyan University at Delaware, Findlay College at Findlay, Kenyon College at Gambier, Hiram College at Hiram, Oberlin College at Oberlin, Heidelberg University at Tiffin, Otterbein University at Westerville, University of Wooster at Wooster, Antioch College at Yellow Springs, University of Cincinnati at Cincinnati, Denison University at Granville. These are coeducational. Colleges for women are the Oxford College for Women and Western College for Women, both at Oxford, and Lake Erie College at Painesville. Roman Catholic colleges are St. Xavier College at Cincinnati, St. Mary's Institute at Dayton, and St. Ignatius College at Cleveland. The best-known scientific school is the Case School of Applied Science at Cleveland.

Charities and Corrections. The charitable and correction institutions include State hospitals at Athens, Cleveland, Columbus, Dayton, Long View, Massillon, and Toledo, the Ohio Hospital for Epileptics, the State Home at Madison, the Ohio Soldiers and Sailors Home, the Ohio Soldiers' and Sailors' Orphans Home, the State School for the Blind, the State School for the Deaf, Institution for the Feeble-Minded, a State sanitarium, a State penitentiary, a State reformatory, Boys' Industrial School, Girls' Industrial School, and the Lima State Hospital. A reformatory for women was under construction in 1915. A new site of 15 acres has been purchased for the State penitentiary. All sentences to the State reformatory and the State penitentiary are indeterminate. The State has a juvenile-court law and its operation has been very satisfactory.

Religion. Somewhat over one-fourth of the total population are members of some denomination. Of the total number of Church communicants about one-third are Roman Catholics. Ohio has an unusually large number of religious sects. Some of the leading Protestant denominations in order of their numerical strength are Methodist, Presbyterian, Disciples of Christ, Baptist, Lutheran, and United Brethren in Christ.

History. Ohio was formed from a part of the Northwest Territory (q.v.) and includes a portion of the Virginia cession of 1784 and all of the Connecticut cession of 1800. The first explorers cannot be surely determined. Possibly La Salle, about 1670, visited the region, but he left no record of his wanderings. The enmity of the Iroquois kept the French away from Lake Erie long after they had explored the other great lakes, and though large numbers of *coureurs de bois* roamed the wilderness and trading posts were doubtless established, not one resulted in a permanent settlement. About 1686 Governor Dongan, of New York, sent trading expeditions into the region with but little success. In 1749 a French officer, Céloron, under the orders of Gallissonnière, acting Governor of Quebec, crossed Lake Erie, put his boats into the Allegheny, and thus reached the Ohio and the Mississippi. His report is the first authentic relation of this part of the country. At several points he placed tablets declaring all the region of the Ohio to be French territory regardless of the grants of the Stuart kings. English traders were driven out, and this precipitated the French and Indian War. (See OHIO COMPANY.) By the Peace of Paris in 1763 the French possessions east of the Mississippi passed to Great Britain. During the Revolution the only settlement within the present limits of the State, consisting of some Moravian villages near the present site of New Philadelphia, was broken up by Indians and renegade whites. After the Northwest Territory was formed settlement was rapid. Massachusetts pioneers founded Marietta in April, 1788. John Cleves Symmes, of New Jersey, bought a large tract between the Great Miami and the Little Miami rivers and sent out settlers. In 1788, too, a party from Lexington, Ky., founded Losantiville (now Cincinnati) on a portion of this tract. A French settlement was made at Gallipolis in 1789 or 1790, and about the same time Virginians began to come in large numbers. A provision in the Ordinance of 1787 allowed the creation of a representative assembly when 5000 white males of voting age should be resident in the Territory. The first session of such an assembly was held at Cincinnati in 1799, and William Henry Harrison was chosen the first delegate to Congress. In 1800 Connecticut completely abandoned her jurisdiction over the Territory along Lake Erie, though she still retained proprietary rights in the soil. This was called the Western Reserve (q.v.) and rapidly filled with settlers chiefly from New England. In May, 1800, the Territory was divided and the western part was named Indiana.

On April 30, 1802, Congress authorized the election of delegates to a convention to determine whether a State government should be established. The convention sat at Chillicothe, November 1–29, and adopted a constitution, which was not submitted to the people. The boundaries were fixed, according to the suggestion of Congress, as the Pennsylvania line on the east, the Ohio River on the south, a north and south line from the mouth of the Great Miami to its intersection with an east-and-west line passing through the most southerly point of Lake Michigan on the west, and this east-and-west line through Lake Erie to the Pennsylvania line on the north. A proviso was inserted, however, that if this northern line should touch Lake Erie south and east of the mouth of the Maumee, the northern line should then run from Lake Michigan through the mouth of this stream. Such was found to be the case later, and Michigan refused to give up claim to the strip of territory including Toledo until it was made a condition of her admission as a State in 1834. An election for members of the Legislature was ordered for Jan. 11, 1803, and the Legislature met on March 1. Meanwhile, on February 19, Congress declared that Ohio, by adopting a constitution, had become a State of the Union, though there was as yet no State government. The capital was fixed at Chillicothe and so remained until 1810 and was then moved to Zanesville. In 1812 the offer of a land company to build a new city was accepted, and since 1816 Columbus has been the seat of government. Considerable excitement was caused by the alleged Burr-Blennerhasset plot in 1806. During the War of 1812 the occupation of Ohio by the British was prevented by Gen. William Henry Harrison. Many Indians joined the British, but the combined forces were defeated, Oct. 5, 1813, on the river Thames in Canada, and Tecumseh, the Indian leader, was killed. This battle, following close upon Perry's victory on Lake Erie, ended the war, so far as this State was concerned. The population steadily increased, but a market for the products of the State was the greatest need. Some seagoing vessels had been built upon the Ohio, but such sailing vessels were worth little on rivers. The application of steam to navigation, the construction of the Erie Canal, and the completion of the Miami and Ohio canals in 1835 made a new era. From that time access to the sea was comparatively easy, and the country entered upon a period of magnificent prosperity, to which the coming of the railroads gave an additional impetus.

The State supplied more than its quota of troops for the Mexican War, and at the outbreak of the Civil War was exceedingly active. Seventy regiments responded to the first call for troops, though only 13 were asked. Soldiers were sent into Virginia and helped to save West Virginia to the Union, and the prompt action of Governor Dennison had its influence upon Kentucky also. There were many Southern sympathizers in southern Ohio, however, and resistance was offered to national officers in 1863, when the advantage seemed to be with the Confederate armies. (See VALLANDIGHAM, CLEMENT L.) A large number of the most successful Federal officers were natives of the State, as Grant, Sherman, McDowell, Rosecrans, Garfield, and others. Ohio was Democratic in national elections from the time of its admission to 1836. In that year it voted with the Whigs, and since then has been Whig and Republican, with the exception of the years 1848 and 1852, when it cast its vote for Cass and Pierce respectively.

Throughout its history Ohio has been a fruitful soil for political activities. It is the birthplace of six Presidents—U. S. Grant, Rutherford B. Hayes, James A. Garfield, Benjamin Harrison, William McKinley, and William H. Taft. Political parties in the State have frequently been divided by factional disputes. The nomination of Mr. Taft for President in 1908 was bitterly opposed by James B. Foraker, then United States Senator, who was himself candidate for the nomination. The Democrats nominated for Governor Judson Harmon, the Republicans renominated Andrew L. Harris. In the November elections Taft received 572,312 votes and Bryan 502,721. The Democrats elected Mr. Harmon Governor, but lost all the other State offices except State Treasurer. Governor Harmon was reëlected in 1910, carrying with him the entire Democratic ticket. Following this election an amazing condition of political corruption was found in Adams and Scioto counties, and as a result of investigations carried on by the authorities several thousand citizens of these counties were indicted for corrupt practices. Even more sensational conditions were revealed subsequently in the State Legislature, where it was discovered that over 60 members, including some of the most prominent officers, were apparently engaged in corrupt practices. Indictments were found against many of these and some of them were convicted. In the municipal elections of 1911 the Socialists elected mayors in 10 towns and cities. A constitutional convention which met in 1912 recommended 42 amendments to the constitution, of which number 34 were adopted in a special election in September of that year. Prominent among these amendments were measures providing for the initiative and referendum and for the regulation of the sale of liquors. Important changes were also made in the acts for the government of cities. By these changes cities were practically given home rule. In the presidential election of 1912 Governor Harmon was one of the most conspicuous candidates for the Democratic nomination, and the State was one of the most hard-fought battlefields of the campaign. In the election in November Wilson received 342,252 votes, Taft 277,066, and Roosevelt 229,327. The Democrats elected James M. Cox Governor. In 1914 the Republicans nominated for Governor Frank B. Willis, the Democrats James M. Cox, and the Progressives James R. Garfield. The Republicans elected Willis by 524,625 votes against 493,367 for Cox and 60,971 for Garfield. The Republicans carried an entire State ticket except Chief Justice of the Supreme Court. An amendment to the constitution changing the unit for local option from the county to the township and municipality was adopted at this election. The following have been the Governors of Ohio:

GOVERNORS OF THE NORTHWEST TERRITORY

Arthur St. Clair	1788–1802
C. W. Byrd (acting)	1802–03

STATE GOVERNORS

Edward Tiffin	Democratic-Republican	1803–07
Thomas Kirker (acting)	" "	1807–08
Samuel Huntington	" "	1808–10
Return Jonathan Meigs	" "	1810–14
Othniel Looker (acting)	" "	1814
Thomas Worthington	" "	1814–18
Ethan Allen Brown	" "	1818–22
Allen Trimble (acting)	" "	1822
Jeremiah Morrow	" "	1822–26
Allen Trimble	" "	1826–30
Duncan McArthur	Whig	1830–32
Robert Lucas	"	1832–36
Joseph Vance	"	1836–38
Wilson Shannon	Democrat	1838–40
Thomas Corwin	Whig	1840–42
Wilson Shannon	Democrat	1842–44
T. W. Bartley (acting)	"	1844
Mordecai Bartley	Whig	1844–46
William Bebb	"	1846–49
Seabury Ford (acting)	"	1849–50
Reuben Wood	Democrat	1850–53
William Medill (acting)	"	1853–54
William Medill	"	1854–56
Salmon P. Chase	Republican	1856–60
William Dennison	"	1860–62
David Tod	"	1862–64
John Brough	"	1864–65
C. Anderson	"	1865–66
Jacob D. Cox	"	1866–68
Rutherford B. Hayes	"	1868–72
Edward F. Noyes	"	1872–74
William Allen	Democrat	1874–76
Rutherford B. Hayes	Republican	1876–77
Thomas L. Young (acting)	"	1877–78
Richard M. Bishop	Democrat	1878–80
Charles Foster	Republican	1880–84
George Hoadly	Democrat	1884–86
Joseph B. Foraker	Republican	1886–90
James E. Campbell	Democrat	1890–92
William McKinley	Republican	1892–96
Asa S. Bushnell	"	1896–1900
George K. Nash	"	1900
Myron T. Herrick	"	1900–04
John M. Pattison	Democrat	1904–06
Andrew L. Harris	Republican	1906–08
Judson Harmon	Democrat	1908–12
James M. Cox	"	1912–14
Frank B. Willis	Republican	1914–

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OHIO COMPANY. In American history, the name applied to two eighteenth-century companies organized for the purpose of exploiting and making settlements in the Ohio valley. The first was an association of prominent Virginia planters and some London merchants and was organized in 1749. It received from George II a grant of 500,000 acres of land lying chiefly south of the Ohio River, in what is now West Virginia. This grant was explored in 1750–51 by Christopher Gist, a surveyor employed by the company, who followed the Ohio valley to the north of the Scioto River. Thomas Lee, president of the Virginia Council, was the originator of the scheme, and Lawrence Washington, a brother of George Washington, was one of the leading members. In 1772 the Walpole Company secured from the King a grant of the whole territory southeast of the Ohio from the Pennsylvania boundary to a point opposite the mouth of the Scioto. The Ohio Company now became merged in the Walpole Company, but as the War of Independence interrupted colonization nothing was accomplished. A second company, known as the Ohio Company of Associates, was formed at Boston on March 3, 1786, by officers and soldiers, chiefly of the Massachusetts, Connecticut, and Rhode Island lines, for the purchase and settlement of Western lands. Gen. Rufus Putnam, Benjamin Tupper, Samuel H. Parsons, and Manasseh Cutler were chosen as directors, and the lands selected for purchase lay along the Ohio River on both sides of the Muskingum. After considerable delay the company secured a grant upon favorable terms from Congress, and the contract was formally signed in October, 1787, by the Treasury Board of Congress and by Dr. Cutler and Winthrop Sargent, acting as agents of the Ohio Company. Two contracts were signed, one by which the Ohio Company purchased, for 66⅔ cents an acre, 1,500,000 acres of land along the north bank of the Ohio River. This tract extended from near the site of what is now Marietta, to a spot nearly opposite the present Huntington. The second contract was an option to purchase the land bounded by the Ohio and Scioto rivers, and the western boundary of the Ohio Company's tract extending north of the tenth township from the Ohio, all this being preëmpted by "Manasseh Cutter and Winthrop Sargent for themselves and others." Then "one equal moiety of the Scioto tract of land mentioned in this second contract" was transferred by Cutter and Sargent to William Duer, the Secretary of the Treasury Board, and his associate. A provision was also made that both parties were to share profit or loss and be equally interested in the sale of the land. In December several companies of surveyors, carpenters, smiths, farmers, and others, under the leadership of General Putnam, emigrated to the new territory, arriving in April, 1788. Opposite Fort Harmer they laid out a town which was named Marietta in honor of the French Queen, Marie Antoinette. Consult: King, *History of Ohio* (Boston, 1888), and McMaster, *History of the People of the*

United States, vol. i (New York, 1883). See Ohio.

OHIO NORTHERN UNIVERSITY. A coeducational institution for higher education at Ada, Ohio. It was founded under the title of the Northwestern Ohio Normal School in 1870 and in 1875 consolidated with the Northwestern Normal School, taking the name of the latter. The name was again changed in 1885 to the Ohio Normal University. In 1898 the owners of the school, which was at that time under private management and control, sold the real estate and personal property to the Methodist Episcopal church. Under the new administration the several departments, formerly semi-independent, were reorganized under one control. In 1904–05 the institution was rechartered under the name of Ohio Northern University. It includes a preparatory school, a college of liberal arts, a normal college, colleges of engineering, commerce, law, agriculture, music, and schools of expression, fine arts, and military training. The college is in session 48 weeks during the year. There were in all departments, in 1914–15, 764 students, with 42 instructors. The university has an endowment of about $200,000. The value of the campus and buildings is about $480,000 and the annual income is about $60,000. In 1915 two new buildings costing $140,000 were completed. The president in that year was Albert Edwin Smith, D.D., Ph.D.

OHIO RIVER. The most important affluent of the Mississippi River in point of the amount of commerce and the longest tributary excepting the Missouri (Map: United States, Eastern Part, J 3). It is formed by the junction at Pittsburgh of the Allegheny and Monongahela rivers, and is navigable, excepting at the lower stages of water, from Pittsburgh to its confluence with the Mississippi, 975 miles. After leaving Pennsylvania it flows between Ohio, Indiana, and Illinois on the right and West Virginia and Kentucky on the left. Its drainage basin is over 200,000 square miles, and the rainfall over the basin averages 43 inches a year. Its drainage area extends on the east to, and in places slightly beyond, the crest of the Alleghany Mountains. To the south it attains the border of the Gulf States. Its discharge of water averages 158,000 cubic feet a second, surpassing that of the Missouri by nearly 40,000 cubic feet. The elevation of the river above the sea is 1021 feet at Pittsburgh and 322 feet at its mouth. The depth of the rock floor of the Ohio beneath the level of the present stream is generally between 30 and 60 feet. Its mean rate of flow is 3 miles an hour, and its mean fall is about 0.70 of a foot to the mile. Its fall varies, however, in various portions of its course. Between Pittsburgh and Beaver it decreases from 19 to 15 inches per mile. Thence to Wheeling, a distance of 64 miles, it is reduced to about 10 inches per mile. Beyond the head of Louisville Rapids, about 507 miles, it is only 5 inches per mile. Below the rapids it hardly attains 3 inches per mile. The Allegheny and Monongahela are regarded as having equal claims as the source of the river, though the Allegheny is longer, with 123 miles of navigation. The Allegheny rises on the plateau of northern Pennsylvania west of the Alleghany Mountains, drains Lake Chautauqua in New York, and descends through a series of narrow valleys to its junction with the Monongahela. The latter river (navigable for 60 miles) draws its farthest supplies from the rains and melting snows of the upland Allegheny valleys in the centre of West Virginia, and in the lower part of its course passes through a valley composed of carboniferous rocks, where coal is mined almost at the water's edge. Below Pittsburgh the Ohio winds through a wide flood plain between the inclosing hills, receiving waters from the north that rise only 10 to 20 miles from the south shore of Lake Erie. The glacial drift in this north part of the Ohio basin changed the line of the water parting so that the crest of the divide between the St. Lawrence and the Ohio basins is now 10 or more miles nearer the lake than in the preglacial epoch. The chief northern tributary is the Wabash, a placid stream navigable by small boats to Terre Haute, Ind. Other northern affluents, as the Muskingum, the Scioto, and the Miami, descend, like the Allegheny, from the plain studded with lakes not far from Lake Erie. The southern affluents are larger, and rise, like the Monongahela, among the upland glades of the Appalachians or on the Appalachian plateau. The Kanawha (navigable to Charleston, W. Va.) and the Licking traverse salt-yielding regions. The Kentucky River (navigable to Beattyville, Ky.) joins the Ohio above the Louisville Rapids and marks the natural division between the middle and lower courses of the river. At Louisville a reef of limestone obstructs the Ohio with a series of rapids which disappear during floods, but arrested navigation at low water until the rapids were turned by lateral riverine canals. The greatest tributaries from the south are the Cumberland, navigable to Burnside, Ky., and the Tennessee, navigable to Knoxville. Altogether the Ohio River system drains six States—Pennsylvania, West Virginia, Ohio, Indiana, Kentucky, and Illinois—with a population equaling nearly one quarter of that of the entire United States.

Many fine towns and cities border the Ohio, the larger places standing chiefly at the mouths of the affluents. The industrial development of these urban centres has been excessively rapid in modern times. The more important of these towns are Pittsburgh, Pa.; Cincinnati, Ohio; Marietta, Ohio; Cairo, Ill; Paducah, Ky.; Louisville, Ky.; Parkersburg, W. Va.; Evansville, Ind.; and Mount Vernon, Ind. Below Louisville the valley broadens and the skirting hills retire to a great distance from the river banks. As the larger part of the drainage comes from the mountain districts, the Ohio is unable in times of very heavy rainfall or rapid thaw of the winter's snow to carry off the vast quantity of water suddenly emptied into it. The volume of its discharge has varied as much as eightfold. The difference between the high and low water marks is sometimes as much as 50 to 60 feet in a single season and in 1887 it exceeded 70 feet during a flood. The river at flood covers the lower parts of many towns on its banks, causing great loss of property and much suffering. In the Ohio valley flood of March–April, 1913, the damage caused a loss of 415 lives in 206 towns, 60,043 buildings were flooded, 419 bridges destroyed, and over $180,000,000 worth of property was lost. On the other hand, in periods of drought the current is often reduced to a fordable depth above Cincinnati. These great variations in the level are a serious impediment to navigation. Boats loaded with many thousands of tons of coal and other freight destined for points on the Ohio and Mississippi are frequently held up for weeks at Pittsburgh waiting for enough water to float them. In spite of this drawback the Ohio and its tributaries carry over 15,000,000 tons of freight a year, mainly coal, lumber, grain, and the product of iron and steel mills and the potteries on their banks. The total length of navigation on the river and its affluents is about 2300 miles. In the development of the West the Ohio played a prominent part. La Salle is supposed to have been the first European who saw the Ohio valley, and George Washington is often quoted as the first to give an approximately accurate description of it.

Consult: Ellet, "Contributions to the Physical Geography of the United States," in *Smithsonian Institution Contributions to Knowledge* (Washington, 1849); Bliss, "Dr. Saugrain's Relation of his Voyage down the Ohio River," in *American Antiquarian Society Proceedings* (Worcester, Mass., 1897); R. G. Thwaites, *On the Storied Ohio* (Chicago, 1903); A. B. Hulbert, *The Ohio River* (New York, 1906).

OHIO STATE ARCHÆOLOGICAL AND HISTORICAL SOCIETY. A learned society, founded in 1875 as the Ohio Archæological Society and reorganized and incorporated under its present name in 1885. Its object is to promote a knowledge of archæology and history, especially as relating to the State of Ohio, through the maintenance of a library and a museum, open to the public, as well as by courses of lectures and the publication of books dealing with subjects within its scope. The society is officially recognized by the State Legislature, from which it receives an annual appropriation for the prosecution of its work. The membership is divided into four classes known as active members, life members, corresponding members, and honorary members. The regular annual meeting of the society is held during the month of February, usually in the city of Columbus. The society issues an annual volume of *Publications* and the *Ohio Archæological and Historical Quarterly*, published at Columbus.

OHIO STATE UNIVERSITY. A coeducational State institution for higher education founded at Columbus, Ohio, in 1870 as the Ohio Agricultural and Mechanical College. It was opened in 1873, but in 1878 the institution was reorganized and the present name was authorized. The original endowment provided by the Land Act of 1862 has been supplemented by a permanent annual grant from the United States government under an Act of 1890, by special appropriations of the General Assembly, and by a permanent annual State grant made in 1891 and doubled in 1896. The university includes departments of arts, philosophy, and science, agriculture, engineering, education, homœopathic medicine, medicine, dentistry, law, pharmacy, veterinary medicine, and a graduate school. On July 1, 1914, the Starling-Ohio Medical College, including a college of dentistry, became a part of the university. The work of the college of arts, philosophy, and science is arranged under group elective systems. The university confers the bachelor's degree in the various departments and the engineer's, master's, and doctor's degree for advanced work. The attendance in 1914–15 was 4943 (net), distributed as follows: arts, 999; engineering, 860; law, 472; agriculture, 1207; pharmacy, 77; veterinary medicine, 182; education, 341; dentistry, 126; graduate, 165; homœopathic medicine, 47; medicine, 234; summer session, 940. The faculty numbered 423. The library contains 120,000 volumes. The university grounds consist of 582 acres, of which 472 are devoted to agricultural and horticultural purposes. A laboratory for summer work is maintained at Sandusky. The value of the property under the control of the university in 1914 was $530,015. The grounds and buildings were valued at $4,590,225. The total endowment was $985,000 and the income $1,061,889. The president in 1915 was W. O. Thompson, D.D., LL.D.

OHIO UNIVERSITY. An educational institution for higher education at Athens, Ohio. It is the oldest institution of college rank in that part of the United States formerly known as the Old Northwest. Before the admission of Ohio to statehood provision was made that there should be a university instituted and established in the town of Athens. This provision, passed by the Territorial Legislature in 1802, specified that the institution to be established should be named the American Western University. In 1804, with the admission of Ohio to the Union, the provisions of the Territorial Act were reënacted and the name of Ohio Institution was substituted for the name originally proposed. It was open for students in 1808. The university buildings are 14 in number, not including 5 buildings occupied as residences. The university includes the college of liberal arts, the State normal college, the college of music, the college of oratory, the school of commerce, the department of physics and electrical engineering, the department of mathematics and civil engineering, and the departments of drawing and painting. The degree of A.B. is given in the college of liberal arts, while the degree of S.B. in Education is given to those who complete the four-year courses in the State normal college. The total enrollment in all departments in 1915 was 4317, and the faculty numbered about 100. The total valuation of the property and the university was in that year about $1,600,000. The financial support is derived from State taxation, special appropriations, and the fees and interest on permanent funds. The receipts from all these sources in 1914 amounted to about $500,000. The library contains about 50,000 volumes. The president in 1915 was Alston Ellis, Ph.D., LL.D.

OHIO WESLEYAN UNIVERSITY. A coeducational institution of higher learning, under the control of the Methodist Episcopal church, established in 1841 at Delaware, Ohio. College classes were not organized, however, until 1844. In 1877 the Ohio Wesleyan Female College, founded in 1853, was united with the university. The university includes a college of liberal arts, academic department, and schools of music and fine arts organized as the conservatory. A school of oratory is also maintained in connection with the college. The institution is administered by a board of trustees, most of whom are elected by certain patronizing Methodist Episcopal conferences in the State of Ohio; it also contains representatives chosen by the alumni and certain trustees elected by the board. The enrollment for 1913–14–15 was: in the college 927, in the conservatory 188, in the academy 51. There are 67 officers of instruction in the several schools, 51 of whom compose the faculty of the college—31 professors, associate professors, and assistant professors, 14 instructors, and 6 assistants. The curriculum leads to the degrees of bachelor of arts and bachelor of science. The productive endowment in June, 1914, was $862,500, the value of the grounds and buildings $1,000,000. The library contains 66,210 volumes. The president in 1915 was Herbert Welch, D.D.

OHIYESA, ō'hē-yä'sȧ. See Eastman, Charles Alexander.

OHLAU, ō'lou. A town of Silesia, Prussia, 16 miles southeast of Breslau, on the Ohle, a tributary of the Oder (Map: Prussia, G 3). The town has a Gymnasium. The large cigar and tobacco factories of the town are supplied by the product of the surrounding country. There are manufactures of white lead, machinery, lime, art goods, vehicles, fertilizer, and shoes. There are also saw mills and brickkilns, and the town has steamboat connection with Breslau. Ohlau was formerly a residence of the dukes of Brieg and of the Sobieskis, and in 1742 became part of Prussia. Pop., 1905, 9233; 1910, 9037.

OHLIGS, ō'lĭks (formerly Merscheid). A town in the Rhine Province, Prussia, near the Rhine, 10 miles southeast of Düsseldorf. There are manufactures of steel goods, umbrella frames, cloth, silk, and bricks. Pop., 1900, 20,682; 1910, 27,839.

OHM, ōm (named after Georg S. Ohm). The practical unit of electrical resistance. It was defined at the London Conference of 1908 as the electrical resistance offered to the passage of an unvarying electric current by a column of mercury 106.3 centimeters long, of uniform cross section, having a mass of 14.4521 grams, the mercury being at the temperature of 0° C. (This would require a cross section of 1.00003 square millimeters.) The ohm is substantially equal to 10^9 C.G.S. electromagnetic units of resistance. See Electrical Units; Resistance, Electrical.

OHM, Georg Simon (1787–1854). A German physicist and discoverer of the famous law in electricity bearing his name. He was born and educated at Erlangen and, after giving instruction in mathematics and physics in a number of schools, he was called in 1817 to a chair in the Gymnasium at Cologne. He made a study of the laws of galvanic currents, and while investigating the relative conductivity of metals finally discovered the relation known as Ohm's law, which underlies all electrical theory and measurement. The experimental proof of this law was first published in a paper in *Schweiggers Journal für Chemie und Physik*, vol. xlvi (1826), under the title of "Bestimmung des Gesetzes nach welchem Metalle die Contaktelectricität leiten, etc." An exposition of the theory is contained in *Die galvanische Kette mathematisch bearbeitet* (1827; Eng. trans., *The Galvanic Circuit, Investigated Mathematically*, 1891). He resigned his professorship at Cologne in 1826, was director of the Nuremberg Polytechnic School (1833–49), and was then called to the chair of physics at Munich. The name "ohm" was given to the unit of electrical resistance by the Paris Congress of Physicists (1881). Previously (1846) the British Association had called the unit of resistance the ohmad. Consult Mann, *Georg Simon Ohm* (Leipzig, 1892), and Eugen von Lommel, *Scientific Work of Georg Simon Ohm*, translated by W. Hallock (Washington, 1893).

OHM'S LAW. See Electricity, *Laws of Steady Electric Currents*.

OHNET, ō'nā', Georges (1848–). A popular French novelist and dramatist, born in Paris. He left law for journalism, attempted the stage with *Regina Sarpi* (1875), and began his novelistic series, "Les batailles de la vie," in 1881. Most of his novels have been translated and several of them dramatized. Story and character are conventional; the tone is monotonously optimistic; but commonplace material is managed with a melodramatic skill that resulted in a remarkable commercial success. He wrote among others: *Le maître de forges* (1882; also dramatized); *Lise Fleuron* (1884); *Le docteur Rameau* (1888); *Nemrod et Cie* (1892); *Le curé de Favières* (1897); *Au fond du gouffre* (1899); *Le brasseur d'affaires* (1901); *La conquérante* (1905); *La grande marnière* (new ed., 1907); *L'Aventure de Raymond Dhautel* (1910); *La serre de l'aigle* (1912); *Le revenant* (1913).

OIDIUM, ō-ĭd'ĭ-ŭm (Neo-Lat., from Gk. *ᾠόν*, *ōon*, egg). The conidial form of certain Erysipheæ, an important family of minute fungi growing on animal and vegetable substances. The species of *Oidium* consist of tiny tubular white or bright-colored threads, forming flocks, simple or irregularly branched, assuming in their upper part the form of strings of beads, which finally break up into elliptic spores. *Oidium albicans* is found on the epithelium in the mouth and throat in the disease called aphthæ, or thrush. It is more common in children and aged persons than in those who are in the prime of life. Another species, *Oidium tuckeri*, has attracted great attention in Europe, on account of its producing a destructive grape disease. This disease is more fully described under Grape as powdery mildew, for which remedies are there suggested.

OIL (OF. *oile*, *ole*, *uile*, Fr. *huile*, from Lat. *oleum*, oil, from Gk. ἔλαιον, *elaion*, oil, olive oil, from ἐλαία, *elaia*, olive tree). A term applied to a large number of liquids characterized by being insoluble in water and highly viscous. Their greasy feeling, often mentioned as an additional characteristic, is due largely to their viscosity and insolubility in water. Capability of saponification (see further below), formerly considered essential, is confined to a variety of substances, chiefly of animal or vegetable origin, while the unsaponifiable class includes the so-called mineral oils and similar products prepared artificially. Chemically the oils possess no property in common which would justify their being grouped together in any rational classification of substances; and if they are still referred to collectively as a distinct class of chemical substances, it is owing partly to custom, partly to the fact that oils which are chemically different are sometimes associated industrially.

Liquid Fats. The vegetable and animal oils or liquid fats do not differ essentially from the class of substances described under Fats. They, too, contain olein, palmitin, and stearin, together with certain other fatty bodies, which give each oil its characteristic properties. Palmitin and stearin are solids at ordinary temperature, but are freely soluble in the liquid olein, and a liquid fat is essentially a solution in one proportion or another of palmitin and stearin in olein. Olive, cottonseed, corn, linseed, and lard oils are types of this class of oils, all of which are soluble in ether, carbon disulphide, chloroform, hydrocarbons, etc.

All of the fatty oils are also capable of being saponified, i.e., of being broken up into glycerin and so-called fatty acids. The term "saponification" (from Lat. *sapo*, soap) is used on account of the decomposition being oftenest effected by the use of caustic soda or potash, which combines with the freed fatty acids to form the mixtures of salts well known as soaps. There are, however, other methods by which the decomposition may be sometimes brought about; and since, whatever the method, the decomposition is accompanied by the chemical absorption of the elements of water, it is more exactly referred to, not as saponification, but as hydrolysis, or hydrolytic splitting. The several methods by which the hydrolysis of oils may be brought about include: (1) boiling with caustic alkali, (2) the action of steam under high pressure, (3) bacterial action, (4) the action of dry heat.

A scientific classification of animal and vegetable oils and fats is determined by the occurrence of cholesterol or phytosteral in these bodies. The former has been found only in fats and oils of animal origin, the latter only in the vegetable forms. On that basis and following Thorpe's arrangement, the classification of the principal oils from vegetable and animal sources is given as follows:

I. **Vegetable Oils.** 1. *Drying Oils.*—Used for paints, varnishes, and soft soap, and in some cases as edible oils. Include linseed, hempseed, poppy-seed, safflower, and sunflower oils; also derived from nuts and woody parts of certain plants.

2. *Semidrying Oils.*—(*a*) Cottonseed-oil group. Edible oils, also used for soap making and for burning purposes. Examples are corn, cottonseed, and sesame oils.

(*b*) Rape-oil group. Used for soap, as lubricants, and in some cases as edible oils. Includes croton, rape, mustard, etc.

3. *Nondrying Oils.*—(*a*) Almond-oil group. Used largely for perfumery and medicines. Includes oils from kernels of cherry, plum, apricot, peach, and almond.

(*b*) Olive-oil group. Mostly of the edible type. Includes oils from various nuts and from the olive and its kernel.

(*c*) Castor-oil group. Edible or medicinal oils having in addition various commercial uses. Grape-seed and castor oils are examples.

Palm and coconut oils are omitted from this classification because solid at ordinary temperatures.

II. **Animal Oils.** 1. *Marine Oils.*—(*a*) Fish oils. Used in currying leather and in some cases for soap making. Principal examples are oils from menhaden, sardine, salmon, herring, and sturgeon.

(*b*) Liver oils. Used in medicine and for currying leather. Include cod, tunny, shark (Arctic), hake, and ray liver oils.

(*c*) Blubber oils. For burning and lubricating purposes, and used in various commercial operations. Obtained from seal, whale, dolphin, and porpoise.

2. *Terrestrial Oils.*—(*a*) Semidrying oils.

(*b*) Nondrying oils. Used for lubricating and for leather dressing. Include sheep's, horses', and neat's-foot oils.

Plants contain a greater variety and, as a rule, relatively larger quantities of oils than animals. Vegetable oils are obtained by the simple process of grinding or crushing and hydraulic pressing of seeds or kernels, which contain the largest proportion of oil. At times the ground materials are pressed cold or hot, the cold process yielding better products but smaller quantities. Oils so obtained are sold as cold-drawn, cold-pressed, salad, and virgin oils. Of late years extraction processes using light hydrocarbon solvents are much used. The solvents are allowed to act on the crushed material at a slightly elevated temperature; on exhaustion the liquid is drawn off and the solvent is separated by distillation. Oils produced by this process are very free from foots or gelatinous material, but, on the other hand, are liable to be contaminated with resins and coloring matters or any other material soluble in the solvent used. Animal oils occur in cells of putrescible tissue and require prompt rendering or extraction to retain their quality. Rendering may be of three types, viz.: (1) open-kettle rendering, (2) acid rendering, (3) steam rendering. In the first process the fatty tissue is chopped, heated over water until the oil or fat is melted, and tried out. The broken tissue shrivels and rises to the top, where it is skimmed off and pressed to remove traces of oil. On cooling the oil and water stratify and may be readily separated. In acid rendering the fatty tissue is, without previous treatment, boiled with water and sulphuric acid, which dissolves away the tissue and liberates the oil. In steam rendering the tissue is destroyed by treatment with steam under pressure in autoclaves, the exhaust of foul-smelling gases being discharged into a chimney.

The drying oils, linseed, poppy-seed, etc., expressed by hot pressure, are subsequently boiled or heated with various oxidizing substances, such as the oxides of lead and manganese, in order to increase their drying or varnish-making properties. On mixing these boiled oils, which always contain some free fatty acid, with pigments whose base is some readily decomposable lead compound, such as white lead (basic carbonate), a lead soap forms and dissolves in the excess of oil. The resulting product, on exposure for some time to the atmosphere, readily dries or forms a tough elastic coating, which acts as a protective covering to the material beneath. Oils of the rape-oil group absorb oxygen when heated, especially if air is forced through the liquid. Such are the so-called blown oils. During this process the liquid becomes thicker, its viscosity and hence the lubricating value increasing materially. The thickness is probably caused by exchange of the sulphur contained by these oils for oxygen. Edible oils of the unsaturated type, e.g., cottonseed, may be changed to the saturated form by a process of hydrogenation. The agent used as a catalyzer is usually colloidal nickel. The product is a more solid form of fat.

The tests usually applied to fatty oils include determinations of specific gravity, of the amount of alkali necessary for saponification, of the amount of free fatty acids present, of the amount of volatile fatty acids, and of the amount of bromine, or iodine that the oil is capable of absorbing, as well as various color tests with acids and special reagents.

Essential or Volatile Oils. These are liquids which give the peculiar odor to plants. Their composition differs very widely. The various types are as follows: terpenes, or hydrocarbons of the general formula $(C_{10}H_{16})_n$; certain esters, aldehydes, ketones, and phenols (substances composed of carbon, hydrogen, and oxygen); and finally, certain substances containing sulphur or nitrogen among their elements, e.g., mustard oil. All these substances are soluble in alcohol, ether, petroleum, and certain other organic solvents. Some of them have been prepared synthetically, but the greater number are still obtained from plants by one of the following processes: (1) by distilling the plant with water, (2) by extraction of the plant with solvents, (3) by pressing the plant, (4) by macerating in fat, (5) by enfleurage, or absorption in fat. In the distillation process as ordinarily conducted steam is passed through the material and on into a condenser, where a separation of oil and water takes place on cooling, the oil being usually on top. Turpentine is produced from the gum of the pine tree by distillation in stills, the residue in the retort being common rosin. The processes of extraction and expression are employed principally for floral essences which would volatilize on distillation. Three methods are used: (1) Extraction by volatile solvents, such as benzene, ether, chloroform, etc. On evaporating the solvent the mixture of essential oil, resin, and coloring matter which remains is treated with alcohol to make a solution of the essence. (2) The enfleurage process. The flowers or leaves are placed on glass-bottomed trays coated with pure tallow or lard; these trays are then stacked up and allowed to stand until the fatty matter becomes strongly charged with the perfume, and this is subsequently extracted with alcohol in closed vessels. (3) The moist-air process. The method consists in passing hot air through wet sponges, then over the flowers, and on into a volatile solvent which retains the perfume and is afterward removed.

Hydrocarbon Oils. An account of the chemistry of the hydrocarbons may be found in a special article under the name. Mixtures of liquid hydrocarbons, or hydrocarbon oils, of natural or artificial origin, are used largely as fuels, illuminants, and lubricants. The main sources of these oils are petroleum, shale, bituminous coal, and natural gas. Most of the native American oil comes from the Devonian and Upper Silurian. It occurs in sandstone or conglomerate (oil sand) between impervious layers of shale or slate. The Russian petroleum deposits are usually of Tertiary origin. Considerable discussion has arisen concerning the origin of petroleum. According to Berthelot it is produced by the action of steam and carbonic-acid gas on alkali metals. Mendeléev regards it as the product of the action of water on metallic carbides. According to other theories petroleum is derived from either plant or animal matter by a slow process of destructive distillation under the enormous pressure of superincumbent strata. Since either natural gas or anthracite coal is usually found at no great distance from oil sources, it would seem that the last-mentioned theories are the most plausible. American petroleum is mainly composed of the liquid members of the marsh gas or paraffin series together with small quantities of olefins and traces of benzenes. Russian oils consist largely of the naphthene series, similar to the olefins. Oil fresh from the well is a thick, sirupy liquid, greenish brown to black in color and of a disagreeable odor. Many samples are fluorescent. The specific gravity varies from 0.782 to 0.85. Marsh gas, ethane, propane, and butane are generally found in the fresh oil, but soon escape. See PETROLEUM.

Lubricating Oils. The analytical tests applied to these oils, including spindle oils and cylinder oils, comprise determinations of specific gravity, the fire test (i.e., determination of the flash point and burning point), the cold test, and especially determinations of viscosity and neutrality. For burning oils the fire test and the determination of neutrality are the most important. A large number of forms of apparatus have been devised for obtaining the flash and burning points, but no other is as simple and reliable as the New York State closed tester. This apparatus consists of a double boiler of copper heated by a gas or lamp flame, the inner chamber being filled with oil and covered with a glass plate perforated with two holes, one for the thermometer, the other for the introduction of the test flame. The oil must not be heated more rapidly or slowly than 2° F. per minute. At minute intervals the test flame is brought to the hole in the glass cover. A flash is said to occur when a blue flame momentarily plays over the surface of the heated oil, and at this point the thermometer is read. The burning point, usually a few degrees higher, is that temperature at which the oil begins to burn.

Previous to the introduction of petroleum products bituminous shale had been subjected to destructive distillation, yielding gas, ammonia, oil, and tar. This process is still carried out in Scotland, Germany, and various other European countries. Oil does not occur as such in bituminous shale, but is liberated by the decomposition of the latter, which is a sort of pitch. Shale, in small pieces, is fed into vertical retorts heated to a low red heat, and steam is injected into the retorts to promote distillation. The vapors are condensed in a hydraulic main and scrubbers similar to those employed in the distillation of coal (see GAS, ILLUMINATING AND FUEL), the gases given off being utilized for heating the retorts. The crude oils are refined with acid and alkali, and are redistilled to furnish naphthas, burning and lubricating oils, and paraffin (q.v.).

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OIL BEETLE. Any of the blister beetles of the family Meloidæ, particularly those of the type genus *Meloë*. See BLISTER BEETLE, and illustration in article METAMORPHOSIS.

OILBIRD. See GUACHARO.

OIL CAKE. The residue which remains in the press when seeds are crushed to express the oil which they contain. The term is often applied specifically to mean linseed cake. Oil cake still retains a portion of the oil of the seed, along with almost all its other constituents, and is valuable either for feeding cattle or for manure. As it is too rich in proteins and fats to be given alone, it is fed in connection with grain and coarse fodder. Sometimes the cake is ground, in which case the product is known as oil meal. The amount of oil remaining in the cake depends upon the process employed in expressing—whether by simple pressure, by pressure combined with heat, or by a solvent, as carbon disulphide or petroleum ether. From 8 to 10 per cent of oil is now left in the cake when extracted by the former method, but when solvents are used the amount may be reduced to only 2 or 3 per cent. The latter is known as new-process cake or meal, and that obtained in pressing as old-process.

COMPOSITION OF THE MOST IMPORTANT OIL CAKES

(FROM HENRY'S *Feeds and Feeding*)

	Water	Ash	Crude protein	CARBOHYDRATES		Fat
				Crude fibre	Nitrogen-free extract	
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Peanut (earthnut) cake	10.7	4.9	47.6	5.1	23.7	8.0
Cottonseed cake or meal	7.0	6.6	45.3	6.3	24.6	10.2
Rapeseed cake	10.0	7.9	31.2	11.3	30.0	9.6
Linseed cake, old process	9.8	5.5	33.9	7.3	35.7	7.8
Linseed cake, new process	9.0	5.5	37.5	8.9	36.4	2.0
Sunflower-seed cake	10.8	6.7	32.8	13.5	27.1	9.1
Palm-nut cake	10.4	4.3	16.8	24.0	35.0	9.5
Coconut cake	10.3	5.9	19.7	14.4	38.7	11.0
Sesame cake	7.4	8.8	36.7	3.8	17.3	26.0

Exports of oil cake from the United States amounted in value to $29,444,000 in 1913, that from cottonseed being $15,225,000 and from linseed $12,982,000.

The table shown above gives the composition of a number of the most important oil cakes. See COTTONSEED AND ITS PRODUCTS; COTTONSEED MEAL; FEEDING STUFFS; LINSEED MEAL.

OIL CITY. A city in Venango Co., Pa., 132 miles by rail north by east of Pittsburgh, on the Allegheny River, at the mouth of Oil Creek, and on the Erie, the Pennsylvania, and the Lake Shore and Michigan Southern railroads (Map: Pennsylvania, B 3). There are several steel-arch bridges within the municipal limits, and Monarch and Hasson's parks. The more prominent structures include the Carnegie library, Y. M. C. A., armory, city hospital, high school, and the office buildings of the Standard Oil Company. Oil City is the centre of the celebrated petroleum fields of western Pennsylvania and has large refineries and barrel works; also foundries and machine shops, tubing and casing works, boiler and engine shops, and manufactories of oil-well supplies. Under the Act of Assembly of 1911 the government is vested in a mayor, elected every four years, and a council of four members, elected every two years, by whom all administrative officers are chosen, except the comptroller, assessors, constables and school board, who are chosen by popular vote. The water works are owned by the municipality. Oil City was settled about 1825, but did not become of any particular importance until after 1859, when oil was first discovered in Oil Creek valley. It was incorporated as a borough in 1863 and in 1871 it received a city charter. On June 5, 1892, a quantity of burning oil swept down Oil Creek from a benzine tank about 2 miles above the city and caused the loss of 47 lives and of property valued at more than $1,000,000. Pop., 1900, 13,264; 1910, 15,657; 1914 (U. S. est.), 18,319.

OILCLOTH. A coarse canvas, coated on both sides and partly saturated with thick oil paint, one side having usually a colored pattern printed upon it in oil paint. The canvas basis for oilcloth is usually jute or burlap. This is first sized by drawing through troughs filled with liquid glue, rye flour, tapioca, or varnish, different manufacturers employing different materials. As the canvas passes through the trough the surplus sizing is squeezed out by rollers between which it passes. In making the very wide varieties the canvas is put upon a frame first and the sizing applied with a brush. After the cloth is sized it is rubbed down thoroughly with pumice stone, either by hand or with steam rollers. The cloth then receives a coat of paint composed of ochre, benzine, and linseed oil. The surface is afterward evened down by passing the cloth through a series of metal blades, which scrape off the superfluous paint. The surface is again rubbed down with pumice stone, and the process of painting and rubbing down is repeated many times, the number determining the quality of the cloth. The next step is the applying of the pattern. The pattern is carved on wooden blocks, a separate block for each color. The blocks are of pine faced with a thin layer of harder wood, which is glued on. The part of the design assigned to each block is carved in relief upon it. The color is applied by rollers which have taken up the coloring matter from troughs. The printing of the cloth is done by machinery. The cloth passes over a table and under the blocks, which have a rising and falling motion. The cloth is now passed to the drying room, where the process of drying is hastened by artificial heat. When dry and hard the cloth is varnished, trimmed, and rolled. Instead of the carved blocks manufacturers sometimes use pin blocks, which consist of three layers of wood firmly cemented together. The surface block is divided up into a series of pegs and interstices by sawing the block in lines very close together and at right angles to each other. All the pegs not needed for outlining the figure are then cut away. According to the thirteenth United States Census, *Manufactures* (1913), the production of floor oilcloth in 1909 in the United States amounted to 18,354,851 square yards, valued at $3,776,660. See LINOLEUM.

OIL/DAG. See Acheson, E. G.

OIL ENGINE. See Internal-Combustion Engine.

OILEUS, ō-ī'lūs (Lat., from Gk. Ὀιλεύς). A king of the Locrians, best known as the father of Ajax the Less. See Ajax.

OILFISH, or Golomynka. A remarkable fish (*Comephorus baikalensis*) of the blenny family, living only in Lake Baikal (q.v.). It is about a foot long, is destitute of scales, and is very soft, its whole substance abounding in oil, which is obtained from it by pressure. It is never eaten. In winter it retires to great depths, but in summer approaches the shores, and great numbers often are stranded. See Escolar.

OIL GAS. See Gas, Illuminating and Fuel.

OIL OF BITTER ALMONDS. See Benzaldehyde.

OIL OF MUSTARD. See Mustard Oil.

OIL OF SPIKE. See Lavender.

OIL PAINTING. A process of painting in which the pigments are mixed with oil. Vegetable oils, which dry rapidly, are most commonly used, such as linseed, poppy, and nut oil. The varnishes used are prepared by dissolving resins in oil. The chief advantage of oil colors is their great convenience. They mix easily, can be painted over or fused at will, and have greater depth and brilliancy. There is no evidence that painting in oil was known to the ancients. It was practiced in Europe during the Middle Ages, especially by the Byzantines and Germans. Both Theophilus and Heraclius, German monks of about 1100 A.D., minutely describe the process. The Italian practice in the school of Giotto is described by Cennino (c.1400). From these authorities we learn that oil and tempera (q.v.) were often used on the same picture, the oils especially for the flesh tints. Tempera panels often received an oil varnish, making it difficult to distinguish the processes in the primitives. The generally accepted tradition that the brothers Van Eyck invented oil painting must therefore be modified. They merely improved a method already understood. The Flemings introduced the oil technique into Spain and southern Italy, whence Antonello da Messina (q.v.) brought it to Venice. But among all primitives the treatment was the same in oil as in tempera. It was reserved for the Venetians to develop the possibilities of oil painting by a much freer handling, begun by Bellini, and continued by Giorgione, Titian, and the rest. Their method consisted in an underpainting of dead color over which the design was laid in rich transparent pigments, through which the ground showed when desired. Rubens and the late Flemings practiced the opposite method, first laying in the shadows, into which, still wet, the high tones and high lights were painted in solid pigments mixed with white,—a method still largely followed. Other painters of the Golden Age, like Rembrandt and Velazquez, varied their practice, as have also most modern artists. The Impressionists and some of the other recent schools did away with the ground, laying on pure pigments side by side and using neither glazes nor varnish.

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OIL PALM (*Elæis*). A genus of palms of the same tribe with the coconut palm. The best-known species, *Elæis guineensis*, sometimes attains a height of 20 to 30 feet, has pinnate leaves with spiny footstalks and flowers with an odor like anise or chervil. The fruit forms an immense cluster, consisting of 150 to 200 bright orange-colored thin-skinned drupes, with hard stones and oily pulps, which by bruising and boiling yield a bland violet-smelling oil which when taken to cold climates becomes butter-like in consistency, each tree yielding about seven and a half pounds of oil. This oil, now largely exported from tropical Africa, is much used for making candles, toilet soaps, etc., but when fresh is eaten like butter. Attempts are being made to grow oil palms in a commercial way, but the chief source of the oil is from wild trees in western Africa. The nut was formerly rejected as useless after the oil had been obtained from the fruit; but from its kernel a fixed clear and limpid oil called palm-nut oil is extracted and has become to some extent an article of commerce. The fruits of a number of other palms yield oil when submitted to pressure.

OIL PIPE LINES. See Pipe Lines.

OIL RIVERS. A name applied to the channels forming the delta of the Niger (q.v.) in west Africa and the neighboring small independent rivers, on account of the vast forests of oil palms which line their banks. The surrounding district, a British dependency, was formerly known as the Oil Rivers Protectorate, constituted in 1885, and is now a part of the Colony and Protectorate of Nigeria.

OILS. See Oil.

OIL SAND. A term applied to beds of sand or porous sand rock which contain petroleum. See Petroleum.

OIL SHALE. An oil shale is one containing petroleum, often in sufficient quantities to make it practicable to extract the oil by distillation in retorts. They are at present of economic value in Scotland, but large deposits are known in New Brunswick and Utah.

OIL SHARK, or Soup-Fin Shark. A tope-like shark of southern California (*Galeorhinus zyopterus*), often 6 feet long and grayish in color, with the front of both dorsal fins black. It is sought for the oil in its liver—single fishes sometimes yielding a gallon—and for the fins, which are highly prized by the Chinese as material for soup. The fins are dried and a fine white gelatin is extracted. The fish is rarely taken except in July and August, when it enters quiet bays to be delivered of its young. See Plate of Lampreys and Dogfish.

OILSTONE. A very smooth fine-grained type of rock used for abrasive purposes, more especially for sharpening various cutting instruments. The material used in the manufacture of oilstones is obtained from a number of different localities, but the most important stones at the present time are those from Arkansas, Indiana, and Germany. Those from Arkansas go under the name of ***Arkansas*** and ***Washita*** stones and are an extremely fine-grained siliceous rock of white color. They are especially adapted to sharpening fine tools requiring smooth edges. The German stone is much used for razor hones. The Indiana oilstones, which are very fine-grained sandstones, are commonly known in the market as ***Hindostan*** or ***Orange***

stones. They are not suited for sharpening such fine steel instruments as those for which Washita rock is used. See Abrasives.

OIL WELLS. See Petroleum.

OINT'MENT (ME. *oinement*, from OF. *oignement*, from *oigner*, *oindre*, *ongier*, to anoint, from Lat. *unguere*, *ungere*, Skt. *añj*, to smear). A fatty preparation, either soft or solid at ordinary temperatures, but liquid when rubbed into the skin. Ointments are composed of a fatty base, either lard or petrolatum (q.v.), alone or mixed with olive or almond oil or with spermaceti or wax, to diminish or increase their consistency as desired. Benzoin is often added to the lard or other base to prevent decomposition. Hydrated sheep's-wool fat (see Lanolin) is more quickly absorbed than most fats, and may be mixed with more than twice its weight of water without losing its ointment-like character. It is employed as a base when rapid absorption is wished, as sometimes happens in the case of mercury. Into the base is thoroughly incorporated the substance which, as a rule, gives to the ointment its remedial virtues. The greatest care is necessary to insure a minute subdivision of the medicinal element in order that the ointment may be homogeneous and free from gritty particles. The United States Pharmacopœia recognizes 24 ointments, but many more are made. Among the better known may be mentioned zinc, sulphur, and the various mercurial ointments. Cold cream (q.v.) is the popular name of rose-water ointment.

OISE, wäz. A northern department of France, formed from parts of the former provinces of Ile de France and Picardy, and lying on both sides of the Oise River, north of the departments Seine-et-Oise and Seine-et-Marne (Map: France, N., H 3). Area, 2272 square miles. The surface is generally level and about two-thirds of it is cultivated, producing cereals, potatoes, sugar beets, and large quantities of fruit, including grapes. Stock raising and agriculture are well developed, as are the industries, which include the manufacture of iron, pottery, paper, chemicals, and textiles. Pop., 1901, 407,808; 1911, 411,028.

OISE. A river of north France. It rises among the Ardennes in south Belgium, flows southwest through the French departments of Nord, Aisne, Oise, and Seine-et-Oise, and joins the Seine 15 miles northwest of Paris (Map: France, N., H 3). Its length is 189 miles, and it is navigable by a channel canalized to 6 feet 6 inches to Janville; above this a lateral canal follows the river to Landrecies, and other canals connect it with the Somme, the Sambre, and the Scheldt rivers. The principal towns on its banks are Compiègne, Chauny, and Novon.

OISIN, ōsh'ĭn. See Ossian.

OJEDA, ō-hā'dȧ, Alonso de (c.1465–1515). A Spanish explorer, born of noble parentage, in Cuenca. He accompanied Columbus on his second voyage, and from that time until his death was closely associated with the exploration and settlement of the newly discovered region. One of his first exploits was the capture by stratagem, in 1495, of the cacique Caonabo, who had formed a scheme for an alliance of all the natives against the Spaniards in Hispaniola. Four years later, accompanied by Columbus' former pilot, Juan de la Cosa, and by Americus Vespucius, he succeeded in exploring the northern coast of South America from some point on the north coast of what we now call Brazil as far westward as Cape de la Vela. He made a second voyage in 1502, and for trespassing on territory given by the papal bull to Portugal was upon his return censured and heavily fined. In 1509, with about 300 men, he sailed from Hispaniola to take possession, as Governor, of Nueva Andalucía, which comprised the territory between the gulfs of Urabá (Darien) and Maracaibo. Near the site of the present town of Cartagena he landed with a party of about 70 men in order to capture Indians for slaves, but the party was overpowered, and only Ojeda and one other man escaped. A colony was then established at San Sebastian, but provisions soon ran so low that Ojeda set out for Hispaniola for supplies and reënforcements. The vessel was wrecked off the coast of Cuba, and Ojeda reached his destination only after great hardships. He was unable to fit out another expedition, and died in great poverty and misery at Santo Domingo. Consult B. de las Casas, *Historia de las Indias* (5 vols., Madrid, 1875–76), and Sir Arthur Helps, *The Spanish Conquest in America* (new ed., 4 vols., New York, 1900–04).

OJETTI, ō-yāt'tē, Ugo (1871–). A Florentine journalist, art critic, and novelist. He used the Milanese newspaper *Corriere della Sera* as his principal organ of expression, while enjoying at the same time a wide popularity as a lecturer. His criticism, of the historical school, seeks in contemporary art and letters the elements that most powerfully affect the aspirations and ideals of the cultivated Italian middle class. His tales, though not lacking in humor, treat with sympathy the tragic problems of life. Among Ojetti's writings are: *Senza Dio* (1894); *Alla scoperta dei letterati* (1895); *Il vecchio* (1898); *L' America vittoriosa* (1899), a volume of travel; *Le vie del peccato* (1902); *Il cavallo di Troia* (2d ed., 1904); *Mimì e la gloria* (1908); *I capricci del conte Ottavio* (2 vols., 1908–09); *Ritratti d' artisti italiani* (1911); *Donni, uomini, e burattini* (1912); *L' Amore e suo figlio* (1913), a novel; also criticisms on many art exhibitions.

OJIB'WA, or CHIPPEWA. The largest and most important tribe of the Algonquian stock (q.v.), formerly holding an extensive territory about the upper Great Lakes, in Michigan, Minnesota, Ontario, Manitoba, and adjacent regions, and now gathered upon a number of reservations within the same area. The name is from a root signifying puckered, or drawn up, said by some authorities to refer to the peculiar sewing of the tribal moccasin, although this derivation is disputed. They call themselves usually *Anishinabeg* (spontaneous men), were known to the French as *Ojibois* or *Saulteurs*, from their residence about Sault Ste. Marie, and were commonly known to the English as *Ojibwa* or, in its corrupted form, *Chippewa*.

Although the Ojibwa are the largest tribe north of Mexico, yet, owing to their looseness of organization and remoteness from the settlement frontier, they were not proportionately conspicuous during the Colonial period. According to their tradition they emigrated from the St. Lawrence region in the east, in company with the Ottawa and Potawatami, the three tribes separating at Mackinaw, the two others going southward, while the Ojibwa spread westward along both shores of Lake Superior. The Cree, Maskegon, and Missisaga (qq.v.) are claimed by the Ojibwa as later offshoots from their own tribe, and are sometimes so closely affiliated that they are hardly distinguished from the Ojibwa. The Ojibwa, Ottawa, and Potawatami, though differing in language, also formed a sort of loose confederacy, and were sometimes for this reason designated in Indian councils as the Three Fires. When first known, about the year 1650, the Ojibwa were confined to a comparatively narrow area close along the shore of Lake Superior, hemmed in by the hostile Sioux and Foxes on the west and south. On procuring firearms from the traders, however, they became aggressive and soon drove out the Foxes from northern Wisconsin, compelling them to take refuge with the Sauk farther south. They then turned their attention to the Sioux, driving them from the headwaters of the Mississippi and continuing their victorious westward march until they had occupied the upper Red River country and established their frontier band in the Turtle Mountains, on the boundary between Dakota and Manitoba, and at Portage la Prairie, Manitoba. These western groups are known as Bungees, or Plains Ojibwa, and have many of the customs peculiar to the Plains Indians. In the meantime other bands of the tribe had overrun the Ontario peninsula, formerly conquered by the Iroquois from the Huron and others. These bands later became known as Missisaga. The Ojibwa first turned the westward tide of Iroquois invasion by inflicting upon them a disastrous defeat at the place thereafter known to the Indians as the Place of Iroquois Bones, now Point Iroquois, near Sault Ste. Marie. Throughout the Colonial wars they adhered to the French side and later to Pontiac, but took sides with the English and Tecumseh against the Americans in the Revolution and the War of 1812, joining with other tribes in the general treaty of peace in 1815. Since then they have been at peace with the whites. By a general treaty of 1825 for the adjustment of intertribal boundaries in the far Northwest the government made an end to the hereditary war between the Ojibwa and the Sioux. By other treaties, on both sides of the line, they have sold the greater part of their former territory, retaining only their present reservations.

Scattered over such an immense region, extending hundreds of miles from east to west, the Ojibwa had a large number of bands and divisions, some of which were hardly known to the others more remote, as well as a large number of clans which were not all represented in the same section. The number of clans is variously stated from 11 to 23, Warren making it 21, grouped into 5 phratries representing original clans, one of which claimed the hereditary chieftainship, while another claimed precedence in the war councils. In their general habit they resembled the other northern Algonquian tribes. Living in a cold country, they gave little or no attention to agriculture, but depended for subsistence upon hunting, fishing, and the gathering of wild fruits and seeds, particularly the abundant wild rice of the lake region, with the sugar which they had learned to extract from the maple. Their houses were framed in wigwam or tepee shape, covered usually with birch bark, from which also they made their light canoes, their bowls and boxes, and upon which they scratched their simple pictograph records. They made no pottery, but were skillful mat weavers. They had an elaborate mythology and ritual, chiefly in the keeping of the secret Mide Society. Despite missionary effort and contact with civilization the primitive culture of the Ojibwa is little modified.

The Ojibwas were estimated in 1764 at about 25,000; in 1783, at 15,000; in 1843, at 30,000; in 1851, at 28,000. They number now about 30,000, divided between the United States and Canada as follows: United States: Minnesota (chiefly at Leech Lake, Red Lake, and White Earth), 8234; Wisconsin (chiefly at Lac Court Oreille, Lac de Flambeau, and La Pointe), 4299; North Dakota (Turtle Mountain), 2966; Michigan, 3725; Kansas, mixed Munsee and Chippewa, 92; Montana, 486. Canada: in Ontario, Manitoba, and Saskatchewan, on numerous small reservations, and variously designated as Chippewas, Ojibbewas, and Saulteaux, 10,760, besides Ojibbewas and Ottawas of Manitoulin and Cockburn islands, 1950. See Colored Plate of INDIANS, AMERICAN.

Bibliography. The principal works in the Ojibwa language are Baraga's Dictionary, Belcourt's Grammar, and the shorter treatises of Schoolcraft. Of myths, the best collection is H. R. Schoolcraft, *Algic Researches* (2 vols., New York, 1839), upon which Longfellow based his *Hiawatha*. In ritual mythology and general description the best work is W. J. Hoffman, "Midewiwin of the Ojibwa," in *Seventh Annual Report of the Bureau of Ethnology* (Washington, 1892). On traditional and later history the most satisfactory is W. W. Warren, "History of the Ojibwa," in Minnesota Historical Society *Collections*, vol. v (St. Paul, 1885), after which come George Copway, *Traditional History and Characteristic Sketches of the Ojibwa Indians* (Boston, 1850), and Peter Jones, *History of the Ojebway Indians* (London, 1861), all three authors being of mixed Ojibwa blood. In special research may be noted A. E. Jenks, "Wild Rice Gatherers," in *Nineteenth Annual Report of the Bureau of American Ethnology* (Washington, 1900), and Frances Densmore, *Chippewa Music* (2 vols., ib., 1913).

OJINAGA, ō'hē-nä'gȧ (formerly Presidio del Norte). A town in Chihuahua, Mexico (Map: Mexico, G 3). It is located on the Rio Grande, a few miles below Presidio, Tex., and carries on an active trade with the United States. It was captured by the Federal forces in 1912 and in 1914 recaptured by the Constitutionalists under General Villa, when the whole Federal garrison escaped to the United States.

O. K. Letters used on papers, documents, etc., to indicate that they are all right. The story that General Jackson used these letters to indorse official papers as correct (orl korrect) seems to have been started by Seba Smith (q.v.). It was a hit at Jackson's supposed illiteracy, and as a party cry during the presidential campaign of 1832 acquired great vogue. Parton states that Jackson used to indorse legal documents O. R. (order recorded), and the mistaking of the letters was probably the basis of Downing's jest. The term is also said to have originated with Josh Billings and has been ascribed to several other persons. Jacob Astor is said to have used it to indicate the standing of traders about whom he was questioned. In Colonial days the best tobacco and rum were imported from Aux Cayes, and from this fact Aux Cayes (ō kā) became a popular expression for excellence.

OKA, ō-kä'. A river of central Russia and the principal west affluent of the Volga (Map: Russia, F 3). It rises on the south boundary of the Government of Orel and flows in a generally northeast direction with several large bends, joining the Volga at Nizhni Novgorod after a course of 960 miles through the most fertile parts of Russia. The river is navigable for steamers to the town of Bielev, a distance of 862 miles, and for smaller vessels 32 miles farther to the city of Orel. It is a very important commercial route.

O'KA. A mission settlement of Catholic Iroquois, Nipissing, and Algonquin, on the Lake of Two Mountains, a few miles from Montreal, in Quebec province, Canada. It was settled originally in 1720 by the Catholic Iroquois who had previously been at the Sault au Recollet and who numbered about 900 at the time of removal. They were soon afterward joined by some Nipissing and Algonquin from the abandoned mission of Isle aux Tourtes. The two bodies occupy different parts of the same village, separated by the church, the Iroquois using the Mohawk language, while the others speak Algonquin. In 1881 all but a few removed to Gilson, Ontario, where they are now established.

Ó KANIZSA. See KANIZSA, O.

OKAPI, ō-kä'pē (African name). An animal of the giraffe family (*Ocapia johnstoni*), discovered in 1899 by Sir Harry Johnston in the Semliki Forest of the Congo State. The animal stands about 4½ feet high at the withers, and is of the peculiar form shown on the Plate of GIRAFFE AND OKAPI. The head is giraffe-like, but there are no external horns. The tail is rather short and the neck is short and thick. The skull is characteristically giraffine and exhibits rudiments, or rather vestiges, of three horn cores. The coloration as described by Sir Harry is extraordinary. The cheeks and jaws are yellowish white, contrasting with the dark-colored neck. The forehead and a line down to the muzzle are a deep-red chestnut, and the large broad ears are of the same tint, fringed with black. The neck, shoulders, and body range in tone from sepia and jet black to vinous red; the belly is blackish, the tail chestnut, with a small black tuft. The hind quarters and hind and fore legs are either snowy white or pale cream color, touched here and there with orange and boldly marked with purple-black horizontal stripes and blotches. Not much is known of the okapis except that they live in pairs in the forests of the northern Congo basin. Consult Sir H. H. Johnston, "Okapi," in Smithsonian Institution, *Annual Report*, 1901 (Washington, 1902), and Maurice de Rothschild, "Recherches sur l'okapi et les girafes de l'est africain," in *Annales de la Société Naturelle zoologique*, ninth series, vol. x (Paris, 1909).

OKAVANGO, ō'kȧ-vän'gō. A river of Central Africa. See KUBANGO.

OKAYAMA, ō'kȧ-yä'mȧ. The capital of the prefecture of the same name and of the Province of Bizen, Japan, situated on the river Asahi, in the southwestern part of Hondo, 89 miles by rail west of Kobe (Map: Japan, C 6). It has an old castle formerly inhabited by the daimio, and close to it a magnificent Japanese garden which is known as one of the three most beautiful parks in Japan. Pop., 1898, 58,025; 1908, 93,421; 1913, 86,153.

OKEECHOBEE, ō'kē-chō'bē. A lake in the southern part of Florida, the largest in the southern United States (Map: Florida, F 5). It is about 40 miles long and 30 miles wide, with an area of 733 square miles at the average stage of water and a maximum depth of 22 feet. Its surface is about 20 feet above sea level. On the south it merges into the Everglades, and its shores are comparatively inaccessible, consisting of marshy jungles, while great parts of the lake itself are overgrown with weeds. Its waters are discharged partly by seeping through the Everglades, and partly through the Caloosahatchee River, connection with which has been facilitated by several canals which have reduced the size and depth of the lake and drained portions of the surrounding marshes, rendering them fit for agriculture. See EVERGLADES.

O'KEEFFE, ō-kēf', JOHN (1747–1833). An Irish playwright and actor. He was born in Dublin and began writing comedies at 15. A few years later he joined a theatrical company in his native city, writing meanwhile a number of small pieces, in which he appeared at his own benefits. His *Tony Lumpkin in Town*, produced at the Haymarket, London, in 1778, gained for its author an English reputation. He settled in London and, though threatened with blindness, continued to write for the stage. His dramatic pieces by his own statement number 68, of which about 50 were performed, and some of them, such as the operatic farces *The Highland Reel* and *The Agreeable Surprise* and the farce *Wild Oats*, were unusually successful. In 1798, when he had become almost totally blind, he published *The Dramatic Works of John O'Keeffe, Esq.*, in four volumes. For some years afterward he was in straitened circumstances, till he was relieved by a pension from the crown. In 1830 he went to live in Southampton, where he died on Feb. 4, 1833. His daughter Adelaide, herself an author, published a collection of his verse under the title of *A Father's Legacy to his Daughter* (1834). O'Keeffe's plays, many of which have been separately published, are deficient in characterization and incident and rough in diction, but full of broad humor and rollicking spirits. Consult the *Recollections of the Life of John O'Keeffe* written by himself (London, 1826); also as edited by R. H. Stoddard (New York, 1876); J. Geneste, *Some Account of the English Stage* (Bath, 1832).

OKEFINOKEE (ō'kē-fī-nō'kē) **SWAMP.** (An Indian name, said to mean "trembling earth.") A large swamp in southeast Georgia and northeast Florida never fully explored (Map: Georgia, D 5). It covers about 660 square miles, between 40 and 70 miles from the coast, and its surface is 90 to 115 feet above sea level (much higher than the two other great morasses of the Atlantic seaboard, viz., Dismal Swamp and the Everglades). At ordinary stages of water it discharges into the Gulf of Mexico through the Suwanee River, but in wet seasons some of the water may reach the Atlantic through the St. Mary's River. Where the sand rises a little above the water there are islands covered with open pine forests. Where it is a little lower there are dense forests of cypress, black gum, and other moisture-loving trees growing in muck; and where the muck is several feet deep trees are absent or nearly so, making open marshes known locally as prairies. The prairies are mostly in the eastern part of the swamp, and some of them have an area of several square miles. There are also a few open bodies of water called lakes, most of which are narrow channels tributary to the Suwanee

River. Over the greater part of the swamp the water is too shallow for boating and the muck too soft to walk on. Attempts have been made to drain the swamp by lumber companies. It has long been a favorite resort for sportsmen on account of the variety of birds, fish, and game that take refuge in it. One or two families of white people live on one of the larger islands and make their living chiefly by means of rod and gun. Consult R. M. Harper, *Popular Science Monthly*, June, 1909, and A. H. Wright and F. Harper, the *Auk*, October, 1913.

OKEGHEM, ō′ke-gĕm, **OKEKEM, OCKEGHEM, OCKENHEIM** (c.1430–95). One of the great masters of the Netherlandish school of composition. He was born in East Flanders and was a chorister in the Antwerp Cathedral in 1443–44 and subsequently studied under Dufay. He was first master of music to the French King Charles VII (1454) and held similar important appointments under Louis XI. From 1461 until his death he resided in Paris. As a teacher he is principally famous through his pupil Deprès (q.v.), who introduced his master's style and music to the world at large and greatly influenced modern German Church music through Luther, who was a contemporary and admirer of Deprès. Okeghem's music is still very much admired by musical scholars. He wrote nearly 20 masses, besides numerous motets, a ninefold canon in 36 parts, chansons, etc. Consult Michel Brenet, *Jean d' Okeghem* (Paris, 1893).

O'KELLY, James (c.1757–1826). A pioneer preacher of the Methodist Episcopal church and leader of the first secession from it. He was born in Ireland about 1757, came to America, and in 1778 began work as a traveling preacher. He was among the number who were ordained elders at the organization of the Methodist Episcopal church in 1784. He became presiding elder of the South Virginia district and was a member of the first council meeting in 1789. He took the lead in a movement opposing the authority and life tenure of the bishops. O'Kelly shortly after the General Conference of 1792 withdrew from the connection, taking several other ministers with their congregations or parts of congregations with him, and formed a church known as the Republican Methodist. His opposition to Methodism became more bitter, and he denounced ordination as spurious. His secession movement reached its height in 1795, causing a loss of nearly 6500 members to the Methodist church, chiefly in North Carolina and Virginia. The name of his organization was afterward changed to the Christian church, but at the end of 20 years it had almost disappeared. Consult J. M. Buckley, *History of Methodism in the United States* (2 vols., New York, 1898).

OKEN, ōk′en, **Lorenz** (1779–1851). A German naturalist and philosopher, born at Bohlsbach. His real name was Ockenfuss. He studied medicine and the natural sciences at Würzburg and Göttingen. In 1807 he became a professor of medicine at Jena and in 1812 received the chair of natural sciences, but in 1819 he was compelled to resign his position because a scientific journal called *Isis*, which he had conducted since 1816, gave offense to the government. In 1828 he obtained a professorship in the newly founded University of Munich and in 1833 accepted a chair at Zurich, where he remained until his death. Oken sought to unify all the natural sciences and invented an entirely new and very complicated terminology for the purpose. His system was in some respects fantastic and is now almost obsolete. Some of his speculations were, however, fortunate. As early as 1805 he foreshadowed the theories of the cellular structure of organisms and of the protoplasmic basis of life, and his vertebral theory of the structure of the skull, although false, was an important contribution to comparative morphology. His most important works are: *Grundriss der Naturphilosophie* (1802); *Die Zeugung* (1805); *Ueber die Bedeutung der Schädelknochen* (1806); *Lehrbuch der Naturphilosophie* (1808–11), translated into English by Tulk and called *Elements of Physio-philosophy* (1847); *Lehrbuch der Naturgeschichte* (1813–27); *Allgemeine Naturgeschichte* (1833–42).

OKHOTSK, ō-kŏtsk′, **Sea of**. A large inlet of the Pacific Ocean, indenting the east coast of Siberia and separated from the ocean on the east by the Kamchatka Peninsula and on the south by the Kurile Islands (Map: Asia, Q 3). In the southwest it communicates with the Japan Sea by La Pérouse Strait between the islands of Yezo and Sakhalin and by the long passage which separates Sakhalin from the mainland. It is nearly rectangular in shape, its north shore lying nearly on the sixtieth parallel N., and it is about 1000 miles long and 600 miles wide. The coasts are steep and forbidding, very sparsely inhabited, and icebound from November to April and even to July. The open sea is ice free, but subject to heavy fogs and storms.

OKINAGAN, ō′kē-nä′găn. An important tribe of Salishan stock (q.v.) and formerly the head of a confederacy including also the Colville (q.v.), Sanpoil, and a number of other cognate tribes. They occupied an extensive territory upon Okinagan and Similkameen rivers in north Washington and the adjacent part of British Columbia. They were converted by Jesuit missionaries about 50 years ago and are now civilized and fairly prosperous. They reside upon the Colville reservation in north Washington, numbering 272, and have been made citizens under the allotment act.

OKINAWA, ō′kē-nä′wȧ. A Japanese ken or prefecture formed in 1879 to include those islands of the Luchu (q.v.) Archipelago that were not incorporated into Kagoshima Ken (Map: Japan, H 7). It takes its name from Okinawa (lat. 27° N.; long. 128° E.), the largest of the group.

OKLAHOMA (from the Indian, meaning the land of the red men). One of the west South Central States of the United States, the forty-sixth member of the Union, formed by joining Indian Territory and Oklahoma Territory. It lies between lat. 33° 35′ and 37° N. and long. 94° 29′ and 103° W. and is bounded on the north by Colorado and Kansas, on the east by Missouri and Arkansas, and on the south and west by Texas and New Mexico. Area, 70,057 square miles, of which 643 square miles are water.

Geology. The surface rocks of practically all of Oklahoma are sedimentary, except relatively small areas of igneous rocks in the Arbuckle and Wichita Mountain regions of the southern third of the State. The surface rocks are not greatly disturbed except in the immediate vicinity of the mountain uplifts. The northeastern section is a part of Ozark Mountain uplift.

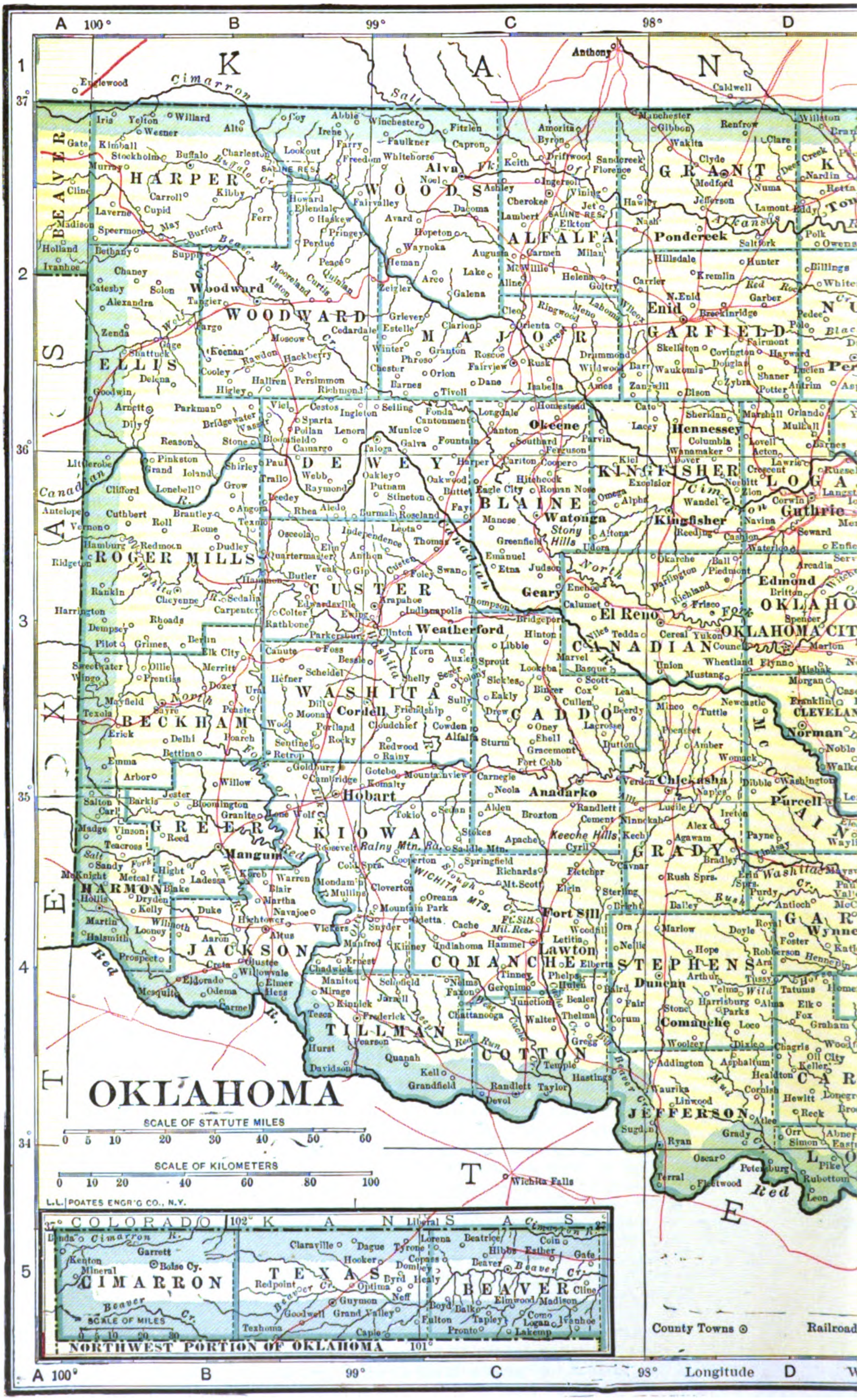
Most of the rocks of this area are of Mississippian age. The area of Pennsylvanian rocks extends to the west and south of the above and about to the limit of the State. These rocks consist of sandstones, shales, and limestones. The Permian red beds extend from the central part to the west boundary, except for areas of Tertiary sands in the northwest. In the south are three mountain groups, the Ouachita, Arbuckle, and Wichita mountains. These mountain uplifts are composed of rocks older than the Pennsylvanian and Permian. The regions are folded and faulted. To the south of the Arbuckle and Wichita Mountains is a strip of Cretaceous rocks extending to the south boundary.

Physiography. The State is divided into about nine physiographic provinces. 1. The Ozark Mountain region is in northeast Oklahoma. The rocks are chiefly limestones, and there are no high peaks or ridges, this part of the State being a high, level table-land about 500 feet above the lowlands or 1100 feet above sea level. The streams have cut down through the limestone and have formed deep, narrow valleys in the mountains. Most of the region is wooded. 2. The Ouachita (Washita) Mountain region in the south includes a number of ranges and groups of mountains and extends into the area from the Arkansas boundary for a distance of 100 miles. These mountains are very rugged and consist of long, low, narrow ridges of sandstone varying from a few hundred to about 3000 feet above sea level. The valleys are produced by the shale beds included in the sandstone formations. The rugged parts are well timbered, while much of the valley land is chiefly prairie; but little of the area is suitable for agricultural purposes. Forests of pine and oak are the valuable assets of the section, and there are numerous asphalt deposits. 3. The Arbuckle Mountain region in the south-central part comprises a strip of country 60 miles long and from 10 to 30 miles wide. The mountains are low, but present excellent mountain structure in the upheaved, broken, and folded beds of limestone and the massive core of solid granite. The highest part is only about 600 or 700 feet above the surrounding country, or about 1400 feet above sea level. Many good mountain streams are fed by strong springs, and the scenery of the region is of particular note. 4. The Wichita Mountains in the southwest have their long axis in line with that of the Arbuckle Mountains and the two groups are certainly parts of the same general uplift, with the connecting portion buried beneath the Red Beds between them. Large areas of granite are exposed and enormous quantities of high commercial value are known. 5. The Sandstone Hills include the part extending west from the Ozark Mountains to the west boundary and south to the Arbuckle and Ouachita mountains. The rocks of the region consist of soft shales and sandstones. The soft shales have been worn away, leaving the hard sandstones as prominent hills. Agriculture is successfully carried on here, and within this region are included the broad valleys of the Arkansas, Neosho, Grand, and Canadian rivers. A number of towns of considerable size are located in this region, and the mineral resources are abundant. 6. The Red Beds lie along the western margin of the Sandstone Hills region. The rocks consist of red shales and sandstones. The country is open prairie and is in general good agricultural land. 7. To the west are the Gypsum Hills, which contain, in addition to the red shales and sandstones, massive beds of gypsum, giving a broken surface to much of the area. 8. The high plains region includes the highest part of the State and lies west of the Gypsum Hills. This is a part of that vast level tract lying east of the base of the Rocky Mountains and extending from Canada to Mexico. In Oklahoma it slopes from an altitude of 4800 feet at the west end of the "Panhandle" to 2000 feet where they join the Gypsum Hills. The soil is very fertile, but lack of rainfall often prevents crops from maturing. There is no timber except an occasional lone elm, cottonwood, or willow beside a stream. The surface is covered with buffalo grass. 9. The coastal plain is situated north of Red River and extends north to the Ouachita and Arbuckle mountains and from the east boundary to the west at least two-thirds of the way across the State. This is the lowest part of the State, the average elevation being about 600 feet. A number of streams which rise in the mountains to the north and flow south across the region have produced broad flat valleys. The entire area is level to gently rolling, except for occasional rougher tracts. The region is almost entirely timber-covered, except for small areas of prairie here and there. The soils are very productive and the water supply is good.

Hydrography. The rock formations in general slope in a westerly direction except in the Red River region, but the drainage is to the southeast. The streams are numerous, but none are at present used for navigation, although some of the rivers have been declared navigable. Red River flows along the south boundary. The Canadian, with its numerous forks, rising in New Mexico, flows nearly east across the State to its junction with the Arkansas, which constitutes the main waterway. The Neosho, Grand, and Verdigris are tributaries of the Arkansas from the north. There are no lakes.

Soils and Climate. The soils are chiefly sand, sandy loam, and sandy-clay loam. The mean annual rainfall as shown by the records for the past 20 years is from 20 to 45 inches for the various stations. The rainfall decreases from east to west, but it is usually well distributed throughout the year. Snow rarely falls in the southern part of the State.

Mining. In 1913 Oklahoma ranked seventh among the States in value of mineral output, chiefly through its production of petroleum, in the value of which it ranked first. The State first attained prominence in this field in 1904, when as a result of drilling in the Osage Indian Reservation the production rose to 1,400,000 barrels as compared with 140,000 in the year before. The output increased rapidly, and in 1908 it was about 46,000,000 barrels. In 1913, 63,579,384 barrels were produced, valued at $59,581,948. The development of coal resources has been somewhat retarded by the attention given to petroleum, although coal ranks second in importance among the minerals produced. While formerly obtained chiefly from the Choctaw Nation and smaller quantities from Cherokee and Creek Nations, most of the coal is now obtained from Pittsburg, Coal, Okmulgee, and Latimer counties. The output in 1913 was 4,165,770 short tons, valued at $8,542,748. In the quantity of natural gas produced, Oklahoma ranks third among the States, and in the value



OKLAHOMA

SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 40 60 80 100
L.L. POATES ENGR'G CO., N.Y.
NORTHWEST PORTION OF OKLAHOMA
SCALE OF MILES
CIMARRON
TEXAS
BEAVER
COLORADO
KANSAS
TEXAS
HARPER
WOODS
ALFALFA
GRANT
KAY
WOODWARD
MAJOR
GARFIELD
NOBLE
ELLIS
DEWEY
BLAINE
KINGFISHER
LOGAN
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
BECKHAM
WASHITA
CADDO
CLEVELAND
GREER
KIOWA
GRADY
MCCLAIN
HARMON
JACKSON
COMANCHE
STEPHENS
GARVIN
TILLMAN
COTTON
JEFFERSON
CARTER
County Towns ◎
Railroad
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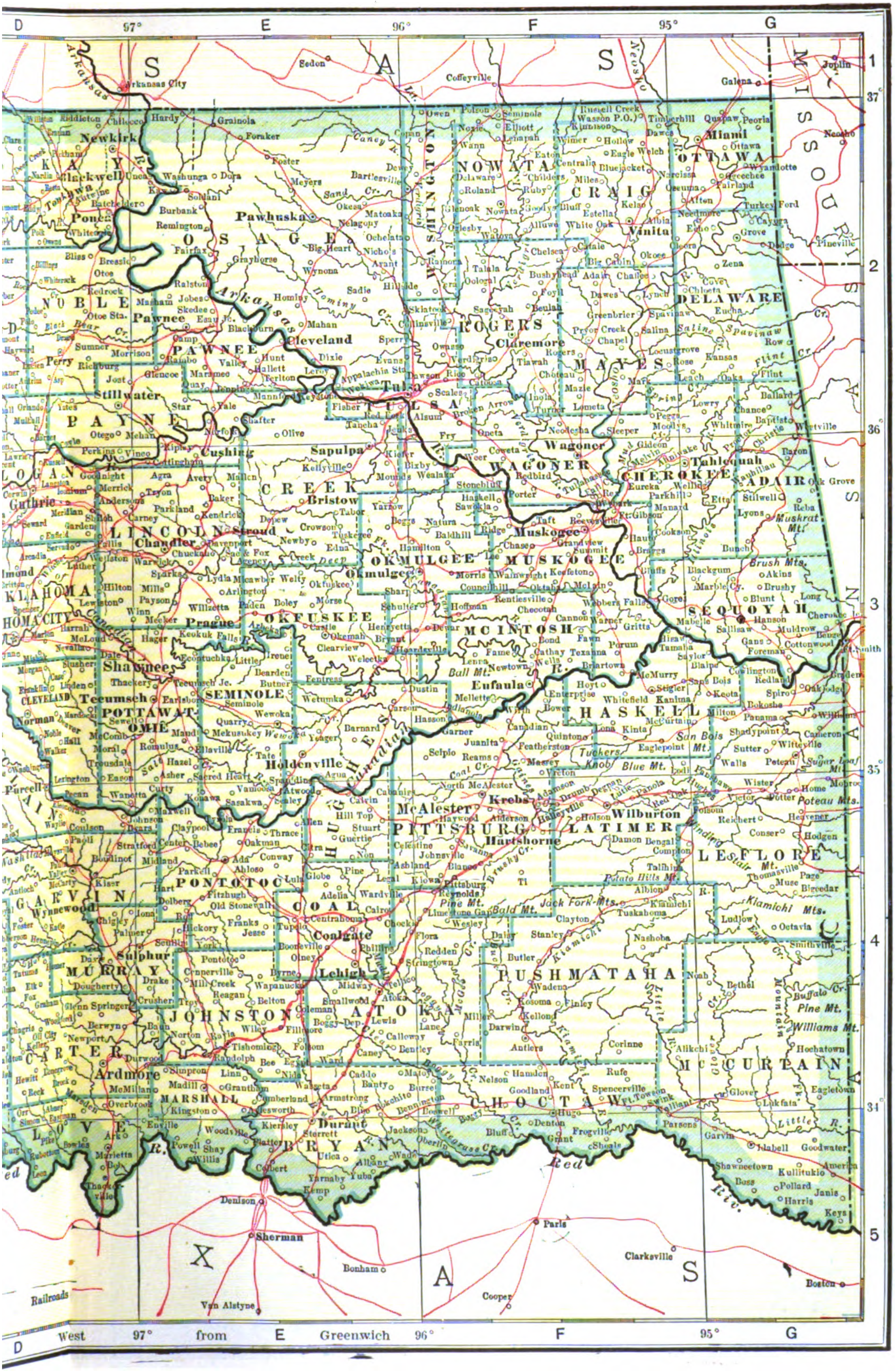
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OTTAWA
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WASHINGTON
NOBLE
Perry
PAWNEE
Pawnee
ROGERS
Claremore
MAYES
DELAWARE
PAYNE
Stillwater
Cushing
TULSA
Tulsa
Broken Arrow
Sapulpa
CREEK
Bristow
WAGONER
Wagoner
CHEROKEE
Tahlequah
ADAIR
Stilwell
LOGAN
Guthrie
LINCOLN
Chandler
Stroud
OKMULGEE
Okmulgee
MUSKOGEE
Muskogee
SEQUOYAH
Sallisaw
OKLAHOMA
OKLAHOMA CITY
OKFUSKEE
Okemah
MCINTOSH
Eufaula
Prague
Shawnee
CLEVELAND
Norman
Tecumseh
POTTAWATOMIE
SEMINOLE
Wewoka
Holdenville
HUGHES
HASKELL
Stigler
Muskogee
Keota
Fort Smith
PITTSBURG
McAlester
Krebs
Hartshorne
LATIMER
Wilburton
LEFLORE
Poteau
Poteau Mts.
Sugar Loaf Mt.
Purcell
GARVIN
Wynnewood
PONTOTOC
Ada
COAL
Coalgate
Lehigh
Atoka
ATOKA
MURRAY
Sulphur
JOHNSTON
Tishomingo
PUSHMATAHA
Antlers
Tuskahoma
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Jack Fork Mts.
Winding Stair Mt.
Blue Mt.
San Bois Mt.
McCURTAIN
Idabel
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CARTER
Ardmore
MARSHALL
Madill
LOVE
Marietta
BRYAN
Durant
CHOCTAW
Hugo
Red R.
Little R.
Arkansas R.
Canadian R.
Cimarron R.
Denison
Sherman
Bonham
Paris
Clarksville
Cooper
Van Alstyne
Boston

of the product fourth. The output in 1913 amounted to 75,017,668,000 cubic feet, valued at $7,436,389. The total value of the three fuel minerals, coal, petroleum, and natural gas, in 1913 was $75,561,085, or 94 per cent of the total mineral output. Ottawa County, in the northeast, has developed some importance in the production of lead and zinc. It forms a part of the lead-zinc region of the Joplin district of southwestern Missouri. The zinc contents of the ores produced in 1913 were 11,664 short tons, valued at $1,306,368. The lead contents of the ores produced were 6228 short tons, valued at $548,064. Clay products, chiefly common and vitrified brick, amounted in value to $573,371 in 1913. The chief quarry product is limestone, which is used for railroad ballast and concrete. The total value of the stone products was $278,600 in 1913. Other mineral products are asphalt, gypsum, lime, commercial mineral waters, pyrite, salt, sand and gravel, and sand-lime brick. The total value of the mineral products in 1913 was $80,168,820.

Agriculture. Of an approximate land area of 44,424,960 acres 28,859,353 acres were in farms in 1910 and the improved land in farms was 17,551,337 acres. The total number of all farms in 1910 was 190,192, the average acres per farm 151.7, the average value of land per acre $22.49. The total value of farm property, including land, buildings, implements and machinery, and live stock, was, in 1910, $918,198,882, an increase of 231 per cent in 10 years. Nearly two-fifths of the farms in Oklahoma are from 100 to 174 acres in size. Of the total number of farms in 1910, 86,055 were operated by owners and managers and 104,137 by tenants. The total acreage of improved land in farms owned or leased by colored farmers was 1,172,819 acres, of which 734,594 acres were operated by owners and 436,741 acres by tenants. The native white farmers numbered 161,773, the foreign-born white farmers 7748, and the negro and other nonwhite 20,671. Of the nonwhite farmers about two-thirds were negroes and the remainder Indians. Of the foreign-born white farmers 3015 were born in Germany.

The table below gives the acreage, production, and value of important crops as estimated for 1914 by the United States Department of Agriculture.

CROPS	Acreage	Prod. bu.	Value
Corn	4,000,000	50,000,000	$32,000,000
Wheat	2,525,000	47,975,000	44,137,000
Potatoes	32,000	2,240,000	2,016,000
Sweet potatoes	6,000	612,000	545,000
Hay	450,000	*508,000	4,013,000
Cotton	2,825,000	†1,250,000	38,862,000

* Tons. † Bales.

The total value of crops in 1909 was $133,454,000 and the combined acreage was 11,921,670. The leading crops in order of their value were corn, cotton, wheat, hay and forage, oats, and cottonseed. Corn represented about two-thirds of the total acreage and value of the cereals. In 1909 there were devoted to this crop 5,914,069 acres, which produced 94,283,407 bushels, valued at $48,080,554. In the acreage of cotton Oklahoma ranked fourth among the States in 1913, but seventh in production. In 1909 this acreage amounted to 1,976,935 and there were produced 555,472 bales of cotton and 277,871 tons of seed, valued at $35,399,356 and $5,788,052 respectively. Wheat had an acreage of 1,169,420 and a production of 14,008,334 bushels, valued at $13,854,322. In that year 1,347,598 acres were devoted to hay and forage; the production amounted to 1,417,533 tons, valued at $9,638,648. Alfalfa is one of the principal forage plants. The production of oats was 16,606,154 bushels, valued at $7,172,267; the acreage devoted to this crop was 609,373. The combined acreage of broom corn, Kafir corn, and milo maize was 748,865; the production was 47,400,477 bushels, valued at $5,090,271. The total acreage of potatoes and other vegetables in 1909 was 88,362 and their value $4,210,844. Excluding potatoes and sweet potatoes and yams the acreage of vegetables was 51,011 and their value $2,610,000. There were grown 64,599 tons of sorghum cane, from which were made 514,807 gallons of sirup. There is a small production of sugar beets. The production of orchard fruits, 1,137,288 bushels, was valued at $943,464. The total production of small fruits in 1909 was 2,310,367 quarts, valued at $202,291.

Live Stock and Dairy Products. Prior to the settlement of the State the western section was used almost entirely as cattle ranges. Changing conditions, however, have resulted in the cutting up of many of the ranges into smaller farms, but Oklahoma is still one of the most important cattle-raising States. The total value of live stock on the farms in 1910 was $148,652,983. On Jan. 1, 1915, there were estimated to be 1,119,000 cattle other than milch cows, valued at $39,613,000; milch cows, 494,000, valued at $25,688,000; horses, 758,000, valued at $61,398,000; mules, 269,000, valued at $25,824,000; sheep, 76,000, valued at $319,000; swine, 1,420,000, valued at $11,644,000. The total number of fowls of all kinds on the farms in 1910 was 8,501,237, valued at $3,713,943. Eggs produced numbered 46,000,600 dozen, valued at $7,544,445. The total value of the milk, cream, and butter fat sold and butter and cheese made in 1910 was $7,365,295. Milk sold amounted to 3,626,217 gallons, valued at $715,455, and the butter made to 27,056,242 pounds, valued at $5,613,253.

Forest Products. In 1908 the area of forest land was 12,500 square miles. The quantity of lumber cut in 1909 was 225,730 M feet of rough lumber, 1233 thousands of lath, and 4635 thousands of shingles. Of the cut of rough lumber over one-half was soft wood, chiefly yellow pine. Of the hardwood the principal variety was oak. In addition to these quantities there were produced on farms in 1909 forest products valued at $1,602,720.

Manufactures. The development of Oklahoma's fuel resources about 1907, coupled with the abundance of such minerals as gypsum, cement rock, asphalt, lead, zinc, etc., caused marked increase in the State's manufacturing activities. The value of manufactured products per capita in 1909 was $32. The table (p. 408) gives the most important figures relative to manufactures in 1909 and 1904.

First in importance are flour-mill and gristmill products. There were produced, in 1909, 2,194,165 barrels of white flour, valued at $10,918,747. Other products were graham flour, corn meal and corn flour, rye flour, and feed. Measured by value of products, the manufacture of oil, cottonseed, and cake is the second industry. There were crushed in that year 186,352 tons of cottonseed, from which were made 6,817,974 gallons of oil and 9,584,227 pounds of linters.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	2,310	18,034	13,143	$38,873	$7,240	$53,682	$19,529
	1904	1,123	7,456	5,456	16,124	2,799	24,459	8,065
Artificial stone	1909	129	426	236	304	120	539	306
	1904	14	49	33	44	18	79	47
Bread and other bakery products	1909	252	766	418	574	252	1,794	825
	1904	121	305	157	225	88	692	282
Butter, cheese, and condensed milk	1909	19	101	62	197	36	1,150	222
	1904	3	16	11	16	6	89	23
Copper, tin, and sheet-iron products	1909	62	344	233	305	184	799	388
	1904	18	95	69	90	52	215	108
Flour-mill and gristmill products	1909	295	1,679	842	7,691	473	19,144	2,651
	1904	108	911	617	4,131	331	12,019	1,832
Foundry and machine-shop products.	1909	64	587	457	1,437	320	1,371	784
	1904	26	158	121	268	77	233	157
Lumber and timber products	1909	342	3,809	3,175	3,603	1,269	4,439	2,952
	1904	60	567	458	512	245	1,017	580
Oil, cottonseed, and cake	1909	39	770	581	5,071	235	5,187	942
	1904	24	606	496	2,590	182	3,109	756
Printing and publishing	1909	598	2,945	1,698	3,734	1,044	3,989	2,985
	1904	423	1,799	1,139	1,700	574	2,101	1,628
Refining of petroleum *	1909	9	129	75	1,057	54	1,055	480
Refining and smelting of zinc*	1909	3	593	566	1,800	343	3,002	870
Slaughtering and meat packing	1909	7	86	63	290	43	889	140
	1904	4	46	39	125	22	294	55
Steam-railroad and car repair shops†	1909	8	1,495	1,412	1,319	942	1,702	1,060

* 1904 statistics not available.

† 1904 statistics cannot be given; would disclose individual operations.

The total number of wage earners in 1909 was 13,143, of whom 12,465 were males. The wage earners under 16 years of age numbered 123, of whom all but 3 were males. For the majority of wage earners employed the prevailing hours of labor were 60 or more a week.

There were in 1910 eight cities with a population of over 10,000—Oklahoma City, Muskogee, Tulsa, Enid, McAlester, Shawnee, Guthrie, and Chickasha. These eight cities contained 33.4 per cent of the average wage earners and produced 37.3 per cent of the total value of manufactures. The most important city is Oklahoma City, in which there were 1398 wage earners and which manufactured products valued at $7,867,884. In this city, as well as in Enid, Muskogee, and Guthrie, the flour-mill and gristmill products and the printing and publishing industry predominated. The leading industries in Chickasha are flour mills and gristmills, cottonseed-oil mills, and steam-railroad repair shops; in McAlester, ice manufacturing and printing and publishing; in Shawnee, steam-railroad repair shops, cottonseed-oil mills, and flour mills and gristmills; and in Tulsa, foundries and machine shops, flour mills and gristmills, and the lumber industry. For further details in regard to the industries of these cities, see articles under their titles in other portions of this work.

Transportation. The total railroad mileage in 1914, not including sidings and spurs, was 6357. The principal roads with their mileage follow: Chicago, Rock Island, and Pacific, 1326; St. Louis and San Francisco, 1498; Atchison, Topeka, and Santa Fe, 950; Missouri, Kansas, and Texas, 692; Wichita Falls and Northwestern (controlled by Missouri and Northwestern), 328; Missouri, Oklahoma, and Gulf, 314; Midland Valley, 246; Fort Smith and Western, 242; Missouri Pacific (St. Louis, Iron Mountain, and Southern), 162; Kansas City, Mexico, and Orient, 187; Kansas City Southern, 152; Oklahoma Central (controlled by Atchison, Topeka, and Santa Fe), 134.

Banks. Rapid economic growth is seen in the development of banking facilities. There were only three banks when Oklahoma Territory was organized. In 1892 there were 9 banks; in 1895, 57; in 1902, 206; and in 1914, 919. The banks are governed by a stringent banking law, passed January, 1898; it created the office of bank commissioner, prohibits private banking, makes quarterly reports obligatory, and defines the minimum of capital and the liability of the officers. The condition of the various banks in 1914 is shown in the following table:

	National	State
Number	346	*573
Capital	$14,989,000	$8,541,000
Surplus	4,347,000	1,201,000
Cash, etc.	6,244,000	2,894,000
Loans	68,921,000	35,069,000
Deposits	71,642,000	39,091,000

* Includes trust companies.

Government. The State constitution was formulated by a constitutional convention held in 1906 and was adopted by the people in 1907. It is an unusually comprehensive instrument and contains many provisions which in other States are subjects of legislative enactment, An amendment may originate in either of the legislative Houses or among the people, but in order to become effective must be adopted by a majority of both Houses and by the electors. Constitutional conventions may be held only after the act providing therefor has been approved by the people on a referendum vote.

Legislative.—The Legislature, consisting of a Senate and a House of Representatives, meets biennially on the first Monday in January of odd-numbered years. The Senate consists of not more than 44 members, elected for a term of four years; the House of Representatives of not more than 109 members, elected for a term of two years. There were, in 1915, 44 Senators and 99 Representatives. The initiative and referendum has been adopted and is in full force.

Executive.—The executive authority is vested in a Governor, Lieutenant Governor, Secretary of State, Auditor, Attorney-General, Treasurer, Superintendent of Public Instruction, Commissioner of Labor, Commissioner of Charity and Correction, Commissioner of Insurance, State Examiner and Inspector, and Chief Mine Inspector, all of whom are elected for terms of four years. All executive officers must be at least 30 years of age and must have been qualified electors of the State for two years next preceding their election. The Governor, Secretary of State, Auditor, and Treasurer are not eligible to succeed themselves immediately.

Judiciary.—The judicial power is vested in a supreme court, district courts, county courts, courts of justices of the peace, and municipal courts. Five judges, one of whom is the Chief Justice and all of whom are elected for a term of six years, form the supreme court. The State is divided into 21 judicial districts, in each of which there is elected for a term of four years a judge of the district court, except that in the thirteenth judicial district two judges are elected. In each county there is a court which is a court of record, judges to which are elected for a term of two years. The county court has the general jurisdiction of a probate court. A justice of the peace is elected in each county, and in cities of more than 2500 inhabitants two such judges are elected.

Suffrage and Elections.—All male citizens of the United States (including persons of native Indian descent) over the age of 21 years who have resided in the State one year, in the county six months, and in the election precinct thirty days next preceding an election are entitled to vote. A constitutional amendment providing that no person unable to read and write any section of the constitution be allowed to vote was adopted in 1910. This amendment also contained a form of the so-called grandfather clause, which was declared unconstitutional by the United States Supreme Court in June, 1915. (See under SUFFRAGE.) All nominations are made by primary elections or petition. In elections for United States Senator provisions are made for the expression of first and second choice by the voters. Candidates must file accounts of expenditures to the Secretary of State. General elections are held on the first Tuesday after the first Monday in November in even years dating from 1908. The so-called Massachusetts form of ballot is used in elections. Corporations are not permitted to contribute to campaign funds. Women are allowed to vote in school elections.

Local and Municipal Government.—Each county is organized into a corporate body. The general management is intrusted to three county commissioners. Other county officers include county clerk, sheriff, treasurer, register of deeds, and surveyors. Cities containing a population of more than 2000 inhabitants may frame a charter for their own government. The privileges of the initiative and referendum are reserved to the people of municipal corporations. Franchises may not be granted by municipal corporations without the approval of the qualified electors.

Miscellaneous Constitutional and Statutory Provisions.—There is a corporation commission, which has general charge of railways and oil pipe lines. There is a law providing for the guarantee of bank deposits. There are a child-labor law and a law making eight hours a day's labor on all public works. There is a State fire marshal with supervisory powers over all fire departments. By provision of the constitution the manufacture and sale of intoxicating liquors are forbidden for a term of 21 years dating from 1907.

Finances. The indebtedness was reported by the United States Census at $6,930,243 in 1912, of which $3,055,000 was bonded and $3,875,243 floating debt, and was stated at the same total ($6,930,243) at the close of the fiscal year 1913. The funded debt consists in $1,460,000 funding bonds, the remainder in bonds for public building construction. The State and school lands fund for use of the public schools amounts to $5,337,819, of which the principal must remain inviolable. A large part of this was appropriated to the State for the use of schools in lieu of Indian lands. The revenues are reported for 1913 by the United States Census Office at $3,358,843 and the cash balance on hand at the close of the year $1,387,177.

Militia. The males of militia age in 1910 numbered 357,933. The organized militia on Dec. 31, 1914, comprised 1110 enlisted men and 65 officers. It included a regiment of infantry, two separate troops of cavalry, a company of engineers, one company of signal corps, and a detachment of sanitary troops, including a field hospital.

Population. In 1910 Oklahoma ranked twenty-third in population. The population at the last three decennial censuses and at the special census of 1907 was as follows: 1890, 258,657; 1900, 790,391; 1907, 1,414,177; 1910, 1,657,155. The estimated population for July, 1915, was 2,114,307. The average number of people to the square mile in 1910 was 23.9. The native whites numbered 1,404,447, the foreign-born whites 40,084, negroes 137,612, and Indians 74,825. Of the foreign-born 25.2 per cent came from Germany. Of the native population 31.9 per cent was born in the State, and of those born in other States Texas contributed 12.7 per cent, Missouri 10 per cent, and Arkansas 8.2 per cent. By sex the population was divided into 881,578 males and 775,577 females. The males of voting age numbered 447,266. There were in 1910 eight cities with a population of 10,000 or over. These with their population for 1910 and 1914 (estimated) follow: Oklahoma City, 64,205 and 83,559; Muskogee, 25,278 and 38,309; Tulsa, 18,182 and 27,634; Enid, 13,799 and 18,209; McAlester, 12,954 and 16,716; Shawnee, 12,474 and 16,312; Guthrie, 11,654 and 11,911; Chickasha, 10,320 and 13,873.

Education. The constitution of 1907 made provision for the establishment and maintenance of a system of free public schools and for the care and education of the deaf, dumb, and blind. It also provided separate schools for white and for colored children. The succeeding Legislatures have passed measures which have resulted in the upbuilding of an excellent educational system administered by a State Board of Education. The State Superintendent of Public Instruction has general executive power.

The total number of illiterates of 10 years of age and over in 1910 was 67,567. Among the native whites of native parentage the percentage was 3.5, among the foreign-born whites 9.8, and among the negroes 17.7. The total school population according to the Thirteenth Census was 566,323, of which 415,116 attended school. The report of the State Superintendent shows 557,004 persons between the ages of 6 and 21 years in 1913. Of these 511,231 were white and 45,773 were colored. The total enrollment in the public schools in the same year was 469,809, of which 432,451 were white and 37,358 were colored. The total number of teachers in 1913 was 11,407, to whom was paid $5,001,716. The total expenditures for education in 1913 amounted to $8,047,568.

The general scheme of education includes public, private, and sectarian schools. Public schools are supported by taxation. They are organized and maintained upon a complete plan of separation between the white and colored races, but with impartial facilities for each. Agriculture, stock raising, domestic science, and kindred subjects are taught in all the public schools. After January, 1916, all teachers in public schools must have had a high-school or normal training. There were, in 1913, 437 schools doing high-school work. The total enrollment in these schools was 19,414. There are normal schools at Edmond, Alva, Weatherford, Ada, Tahlequah, and Durant. The other institutions for higher education include the State University at Norman, Kingfisher College (Congregational) at Kingfisher, Henry Kendall College (Presbyterian) at Tulsa, the Woman's College at Chickasha, the Colored Agricultural and Normal University at Langston, the State School of Mines and Metallurgy at Wilburton, the Agricultural and Mechanical College at Stillwater, and district agricultural schools at Goodwell, Broken Arrow, Tishomingo, Warner, Helena, and Lawton. Denominational and private colleges are the Methodist University at Guthrie and Christian University at Enid. The State agricultural schools are controlled by the State Board of Agriculture. The Agricultural and Mechanical College at Stillwater is the head of agricultural education in the State.

Charities and Corrections. The charitable and correction institutions include the Oklahoma State Home at Pryor, the Oklahoma School for the Blind at Fort Gibson, an institution for the feeble-minded at Enid, the Industrial Institution for the Deaf, Blind, and Orphans (colored), the Confederate Soldiers Home at Ardmore, the State School for the Deaf at Sulphur, the School for the Blind at Muskogee, the Oklahoma Training School for Boys at Pauls Valley, a sanitarium at Norman, a State penitentiary at McAlester, and a State reformatory at Granite. The Legislature has granted to the Commissioner of Charities and Corrections unusual powers, among others the authority to appear as next friend before a county court having probate jurisdiction in behalf of minors, orphans, defectives, defendants, and delinquents in public institutions. The department has also a public defender who appears in cases for orphans and minors.

Religion. Members of all denominations combined include about 18 per cent of the total population. Of these Roman Catholics form about one-seventh. The leading Protestant denominations in order named are Baptists, Methodists, Disciples of Christ, Presbyterians, and Episcopalians.

History. Oklahoma was a part of the Louisiana Purchase and was included in the "unorganized or Indian country" set apart by Congress in 1834. The Creek Indians (June 14, 1866) ceded to the United States the western part of their domain in Indian Territory for 30 cents an acre, while the Seminoles gave up their entire holdings for 15 cents an acre. The Sacs and Foxes, Cheyennes, and other tribes were settled upon part of these lands, but great tracts remained unoccupied. Though white men were forbidden by law to settle upon these lands, schemes for colonization were developed in 1879. President Hayes issued proclamations both in 1879 and 1880 forbidding settlement, but it was necessary to use troops to dislodge the boomers. Congress in 1885 authorized the President to open negotiations with the Creek and Seminole Indians for the purpose of opening these vacant lands to settlement. This was accomplished in 1889. Troops kept the expectant settlers in order until noon of the appointed day, April 22. A mad race for the best lands and town sites ensued. Canvas towns were laid out and each began to lay plans to secure the capital. There was at once a vast influx of settlers and the population increased at an extraordinary rate. Additional lands were laid open to settlement in 1891, 1893, 1895, 1901, and 1906. There was no government in the Territory until Oklahoma Territory was created (March 2, 1890). The first Legislature met at Guthrie, August 27. The agitation for statehood began in 1891, and a bill admitting Oklahoma as a State passed the House of the Fifty-seventh Congress, but failed to reach a vote in the Senate. Finally, after prolonged debate in Congress, it was provided by the joint Statehood Bill, signed on June 16, 1906, that Oklahoma and Indian territories should be admitted as one State under the name of Oklahoma if such union be approved by each territory. (See INDIAN TERRITORY.) The union being approved, delegates from both territories met at Guthrie and drafted a constitution, which was later adopted by the people. It was probably the most radical instrument of its kind ever adopted in any State of the Union. (See *Government*, above.) Several times during its session the convention came into conflict with the wishes of President Roosevelt. An attempt was made to introduce a clause forbidding any individual, concern, or corporation to bring armed guards into the State without the Governor's consent. President Roosevelt intimated that he would not accept the constitution if this were included. Another clash came when the people tried to introduce a "Jim Crow" clause. This the President would not tolerate. Through the influence of the Indian delegates the vote on prohibition was deferred to a separate election. William H. Taft, in a speech delivered in Oklahoma City on August 24, characterized the constitution as only a code of laws and strongly advised its rejection. It was, however, accepted by an overwhelming majority on Sept. 17, 1907. The Republications nominated Frank Frantz, the Territorial Governor, as the first Governor of the new State, while the Democrats nominated Charles H. Haskell. In a special election held on September 17 Haskell was elected. The prohibition amendment submitted at this time was carried by a large majority. On the day of the election President Roosevelt signed a proclamation uniting the Oklahoma and Indian territories as one State. The first session of the Legislature convened on Sept. 22, 1907. Robert L. Owen and Thomas P. Gore were elected United States Senators. In the presidential election of 1908 Bryan received 122,406 votes, Taft 116,558, and Debs 21,729. Thomas P. Gore, already elected by the Legislature for the short term in the Senate, was reëlected in January, 1909. At the primary elections held in 1910 the so-called grandfather clause amendment to the constitution was adopted. This was declared unconstitutional by the State Supreme Court, and was carried to the United States Supreme Court, where decision against it was made in June, 1915. In November, 1910, the Democrats elected their candidate, Lee Cruce, for Governor, and three Congressmen. The constitution had made Guthrie the capital until 1913, but at an election held in 1910 the capital was removed to Oklahoma City. This election was held invalid by the State Supreme Court, and Governor Haskell thereupon called a special session of the Legislature to remove the capital to Oklahoma City. The desired measure was passed, and a decision of the Supreme Court on February 9 declaring these laws constitutional finally settled the question. In the presidential election of 1912 Wilson received 119,156 votes, Taft 90,786, and Debs 42,262. A Democratic Legislature was elected. In August, 1914, R. L. Williams was nominated for Governor by the Democrats, John Fields by the Republicans, and J. Hickman by the Progressives. The Democrats elected their candidate with 105,667 votes, compared with 95,859 for Fields and 4186 for Hickman. Senator Gore was reëlected to the Senate. Oklahoma has five Representatives in Congress. The Governors of Oklahoma have been the following:

TERRITORIAL

George W. Steele	1890–91
Robert Martin (acting)	1891–92
Abraham J. Seay	1892–93
William C. Renfrow	1893–97
Cassius M. Barnes	1897–1901
William M. Jenkins	1901
Thompson B. Ferguson	1901–06
Frank Frants	1906–07

STATE

Charles H. Haskell	Democrat	1907–11
Lee Cruce	"	1911–15
R. L. Williams	"	1915–

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OKLAHOMA, University of. A State coeducational institution for higher education founded in 1892 at Norman. It is supported by appropriations made biennially by the State Legislature, by the income from State school lands, and from the rent and proceeds of the sale of 250,000 acres of land set aside by Congress for the university. The departments consist of the college of arts and sciences; school of fine arts, embracing music, drawing, and painting; school of pharmacy; school of engineering, including the schools of civil, chemical, electrical, and mechanical engineering, and mining geology; school of music; school of law; training school for nurses; school of education; school of journalism; school of commerce and industry; graduate school; and extension division. Tuition is free to residents of Oklahoma. The enrollment in all departments in 1914–15 was about 1700, and the faculty numbered 135. The library contains about 23,000 volumes. The college equipment is valued at $175,000 and the grounds and buildings at about $545,000; the annual income is about $250,000. The president in 1915 was Stratton D. Brooks, LL.D.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE. A State institution for agricultural and scientific education founded at Stillwater in 1891. The college includes schools of agriculture, engineering, home economics, science and literature, education, commerce and marketing, veterinary medicine, and a graduate school. There are also a secondary school, a summer school, and a cotton school. A short course of 20 weeks is given in agricultural and domestic economy, and courses in various branches connected directly with practical agriculture are given to farmers. The institution is maintained by State and Federal appropriations and by the rent and sale of lands allotted by the Federal government. There are 14 large brick and stone buildings, besides barns and greenhouses. There are 80 acres in the campus, and a farm of 1000 acres is owned and operated by the college. The entrance requirements in 1915 were raised to 15 units. The secondary school embraces a three years' course leading from the eighth grade to the college course. The total enrollment in all departments in 1914–15 was 2306, and the officers and instructors numbered 104. The value of the ground and buildings is about $575,000. The equipment is worth approximately $325,000, and the income amounts to about $260,000. The library contains about 17,000 volumes and about 80,000 pamphlets. The acting president in 1915 was L. L. Lewis, S.M.

OKLAHOMA CITY. The capital of the State of Oklahoma, its largest city, and the county seat of Oklahoma County, on the North Fork of the Canadian River and on the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Pacific, the St. Louis and San Francisco, and the Missouri, Kansas, and Texas railroads (Map: Oklahoma, D 3). Among the prominent architectural features are the capitol building, Carnegie library, Federal building, high school, and the many splendid churches and schoolhouses. There are important wholesale interests and a trade in cotton, grain, live stock, fruit, and produce, the city being the centre of an oil-producing and fine farming and stock-raising region. Oklahoma City has also attained a position of importance as a manufacturing community, having two large meat-packing plants, extensive flour and grist mills, oil refineries, a cottonseed-oil mill, poultry and egg packing plants, cotton gins and compresses, machine shops, cracker and soap factories, and printing and publishing houses. These in 1909 represented an invested capital of $4,482,000 and a product valued at $7,868,000, showing an increase since 1904 of 114.3 per cent. Settled in 1889, Oklahoma City was incorporated two years later. The government is vested in a commission of five members, elected every four years. In 1913 the city's income was $3,730,000, while its expenditures for maintenance and operation amounted to $865,000, the chief items being $364,000 for education, $79,000 for the police department, $120,000 for the fire department, $76,000 for health and sanitation, and $66,000 for the water-supply system, which is owned by the municipality. Pop., 1900, 10,037; 1910, 64,205; 1914 (U. S. est.), 83,559.

OKLAWAHA, ŏk′lȧ-wä′hȧ (a Creek or Seminole Indian word said to mean "dark, crooked water"). A picturesque river of central Florida, about 150 miles long, rising in the large lakes of Lake County, flowing north across Marion County, turning abruptly eastward near Orange Springs, and joining the St. Johns opposite Welaka, in Putnam County (Map: Florida, E 2). The river is narrow and crooked, but is navigable for launches and small steamers its whole length.

OKMULGEE, ŏk-mŭl′gē. A city and the county seat of Okmulgee Co., Okla., 41 miles west by south of Muskogee, on the St. Louis and San Francisco Railroad (Map: Oklahoma, F 3). It contains a hospital, excellent public schools, and the historic council house, a stone building which was once the capitol of the Creek Indian government and is now used as the county courthouse. Okmulgee is situated in a rich coal, oil, and gas region and has extensive manufactories of window glass and bottles. The city has adopted the commission form of government. Pop., 1900, 2223; 1910, 4176.

OKOLONA, ō′kō-lō′nȧ. A city and one of the county seats of Chickasaw Co., Miss., 122 miles by rail southeast of Memphis, Tenn., on the Mobile and Ohio Railroad (Map: Mississippi, H 2). It contains a high school, a public library, and an industrial high school for colored pupils. The surrounding region is adapted to the raising of cotton, hay, grain, and cattle. Okolona owns its water works and electric-light plant. Pop., 1900, 2177; 1910, 2584.

OK′ONITE. See Ozocerite.

O′KRA. See Hibiscus, and Plate of Yam, Sweet Potato, etc.

OKU, ō′kṳ, Yasukata, Count (1846–). A Japanese soldier, born in the Province of Chikuzen and Fukuoka Prefecture. He entered the army in 1871, fought with distinction on the Imperial side in the civil war of 1877, and was commander of the Fifth Army Division in the war with China in 1894–95. He became general in 1903. On the outbreak of the war with Russia in 1904 he received command of the Second Army, won the battles of Kinchow, or Nan Shan, Telissu, and Ta-shih-chao, and participated in the great battles at Liao-Yang, Shaho, and Mukden. From 1906 to 1912 he was chief of the general staff, and in 1911 he was promoted to field marshal. He was created Baron in 1895 and Count in 1907. See Russo-Japanese War.

OKUBO, ō′kṳ-bō, Toshimitsu (1830–78). A Japanese statesman and reformer. A native of the warlike clan of Satsuma, he was one of the five leaders in the restoration of the Emperor to power in 1867–68. He was Vice Ambassador in the Japanese Embassy of 1872–73 which traveled around the world. Going to Peking in 1874, he settled the Formosan difficulty. For eight years he was in the cabinet of the Emperor. In 1877 a portion of the Satsuma clan, led by his old friend and comrade in arms, Saigo, rebelled. But Okubo remained in the cabinet, aiding in the suppression of the rebellion. In revenge six clansmen of Satsuma killed him while he was on the way to the Emperor's palace.

OKUMA, ō′kṳ-mȧ, Shigenobu, Count (1838–). A Japanese statesman, born at Saga in the Province of Hizen, Kiushu. Okuma was one of the younger leaders in the restoration of the Emperor as sole ruler and the abolition of the shogunate (1867–68). As Minister of Finance (1869–81), he put the fiscal affairs of the Empire on a sound basis. In 1882 he withdrew from the group of men then governing Japan and established the Progressive party, advocating a more rapid advance towards constitutional and parliamentary government. While Minister of Foreign Affairs in 1888–89, he worked (unsuccessfully) for the abolition of the foreign consular courts. Okuma was Minister of Agriculture and Commerce in 1896–97, and in July, 1898, he headed a cabinet of his own, but retired in November. He kept his popularity as a friend of the people and in 1914 was called upon again to form a cabinet. In the elections of March, 1915, after the dissolution of the Diet which opposed his ministry, the faction supporting him was victorious and gained a substantial majority in the Lower House. After a ministerial crisis he reorganized the cabinet in August, 1915. As Premier, Count Okuma came into world prominence by the declaration of war on Germany and the capture of Tsingtao in 1914 and still more by the 21 demands made upon China in 1915. The negotiation of these demands caused much criticism abroad, especially in the United States. Okuma was successful in inducing China to accept part of them, viz., increased privileges and rights in south Manchuria and east Mongolia, a reaffirmation of the nonalienation of Fukien Province in any particular whatever, and joint management of the Han-yeh-ping Company. In return Japan agreed to restore Tsingtao to China, provided the Powers were willing. Group 5 of the demands, which China refused to accept, was shelved for future discussion. In addition to his work as statesman Count Okuma founded at Tokyo, and became president of, Waseda University, for the teaching of law, political economy, and literature, and he also founded the Japanese Women's University.

OLAF, ō′lȧf. The name of five kings of Norway.—Olaf Tryggvesson (969–1000) was great grandson of Harald Haarfagr. He was full of energy and daring and was skilled in using weapons. Having accepted Christianity in England, whither he had gone on Viking expeditions, he endeavored as King of Norway to bring his people to the same faith. Olaf was waylaid at Svolder by the kings of Denmark and Sweden and the sons of Earl Haakon of Norway. After an heroic defense in a great battle he leaped into the sea and was drowned. He founded Nidaros (Trondhjem).—Olaf Haraldsson, called St.

Olaf (995–1030), King of Norway in 1015–30 and the patron saint of the country, was also a descendant of Harald Haarfagr and was Christianized in England. After being baptized in France he carried on the work of the first Olaf in spreading his religion, and he made Norway one kingdom. Petty kings who had been conquered and their nobles called in Canute the Great of Denmark, and Olaf fled to Sweden. Returning he fought Canute at Stiklestad, July 29, 1030, but fell. Misrule followed, and the people eventually recognized that Olaf had been a hero and made him their patron saint. He was canonized in 1164. Churches were dedicated to him in Norway and in many other lands. —Olaf Kyrre (the Peaceful), King in 1066–93, was a son of King Harald Haardraade. He lived in peace with all his neighbors, advanced Christianity and culture, and fostered trade.

OLAF, Order of. See Plate of Orders.

ÖLAND, ẽ'lănd. An island in the Baltic Sea, lying off the southeast coast of Sweden, from which it is separated by Kalmar Sound, from 4 to 17 miles wide (Map: Sweden, F 8). It is included in the Swedish Län of Kalmar. The island is 80 miles in length and from 4 to 10 miles in breadth, with an area of 510 square miles. It consists mainly of a sandstone ridge scantily covered with soil, but in some parts it is well wooded and has good pastures, on which cattle and sheep are reared. In favorable seasons barley, oats, and flax yield good crops. There are large alum works on the island and an extensive line of windmills along the Alwar Hills, near which stands Borgholm (pop., 1910, 1151). This town is famous for the magnificent ruins of Borgholm Castle. Oland was often a battlefield in the wars between Denmark and Sweden. Pop., 1900, 30,408; 1910, 28,692.

OLATHE, ō-lā'thē. A city and the county seat of Johnson Co., Kan., 21 miles southwest of Kansas City, on the St. Louis and San Francisco, the Kansas City, Clinton, and Springfield, and the Atchison, Topeka, and Santa Fe railroads (Map: Kansas, H 5). It is the seat of the State Institution for the Deaf and Dumb and contains a Carnegie library. The adjacent country is largely interested in farming and stock raising, and the city manufactures flour, boots and shoes, furniture, rubber goods, etc. There are municipal water works. Olathe adopted the commission form of government in 1911. Pop., 1900, 3451; 1910, 3272.

OLBERS, ŏl'bĕrs, Heinrich Wilhelm Matthäus (1758–1840). A German physician and astronomer, born at Arbergen, near Bremen. He studied medicine at Göttingen from 1777 till 1780 and subsequently began to practice at Bremen. He first became widely known through his calculation of the orbit of the comet of 1779, which was performed by him while watching by the bedside of a sick patient and was found to be very accurate. In 1781 he rediscovered the planet Uranus, which had previously been supposed to be a comet, and in 1802 and 1807 respectively discovered the planetoids Pallas and Vesta. He also discovered five comets, in 1798, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815, had been some days previously observed in Paris. His observations, calculations, and notices of various comets, which are of value to astronomers, were published in the *Jahrbuch* of Bode (1782–1829), in the *Jahrbuch* of Encke (1832), and in three collections by the Baron de Zach. Most of these calculations were made after a new method, discovered by himself, for determining the orbit of the comet from three observations. It is still employed by astronomers under the name Olbers' method. The general equality of the elements of the planetoids led him to propound the theory that the planetoids are fragments of some large planet which formerly revolved round the sun at a distance equal to the mean of the distances of the planetoids from the same luminary. Olbers's correspondence with Bessel, edited by Adolf Erman, was published in two volumes at Leipzig in 1852. Consult Schilling, *Wilhelm Olbers: Sein Leben und seine Werke* (3 vols., Berlin, 1894–1900).

OLBRICH, ŏl'brĭk, Joseph M. (1867–1908). A German architect, born at Troppau in Austrian Silesia. He studied architecture at Vienna and traveled in Italy, France, and England. In 1898 he produced his first piece of independent work, the exhibition building of the Vienna Secession, and in the following year he became professor of architecture at Darmstadt, Germany, where he had a large share in the construction of the edifices of the well-known Künstlerkolonie—a group of architects and other artists devoted to the new movement in art. He built a large exposition building for Darmstadt in 1906–07 and the Tietz Warehouse at Düsseldorf in 1907–08. Olbrich wrote: *Ideen* (1899; 2d ed., 1904); *Architectur* (2 vols., 1901–07); *Neue Gärten* (1905); *Der Frauen-Rosenhof* (1907).

OLCHAS, ŏl'chȧz, or Mangun. One of the North Tungusic tribes dwelling at the mouth of the river Amur in Asia and closely related to the so-called Reindeer Tunguses. See Tungus.

OLCOTT, ŏl'kot, Eben Erskine (1854–). An American mining engineer and capitalist, born in New York City. He studied at the College of the City of New York, graduated from the Columbia School of Mines in 1874, and then became a practicing engineer in the western part of the United States, in Mexico, and in South America. He became president of the Hudson River Day Line and of the Mary Powell Steamboat Company and a director of the Lincoln National Bank and Safe Deposit Company of New York. In 1901–02 he was president of the American Institute of Mining Engineers.

OLCOTT, Henry Steel (1832–1907). An American theosophist, born at Orange, N. J. After serving in the Civil War he was admitted to the New York bar in 1866 and was then active in the investigations of scandals in the army and navy departments. With Madame Blavatsky (q.v.) Colonel Olcott founded in 1875 the Theosophical Society, of which he was president, and in 1879 he became editor of the *Theosophist*. He was appointed by President Hayes (1878) to report on the trade of the United States and India. Mrs. Annie Besant (q.v.) and he founded the Central Hindu College at Benares and they lectured together throughout India and Ceylon. Finally Olcott made his home at Adyar, Madras, India, where he died. He published *People from the Other World* (1875); *The Buddhist Catechism* (1882), translated into 23 languages; *Theosophy, Religion, and Occult Science* (1885); *Posthumous Humanity* (1887); *Old Diary Leaves* (3 vols. 1895–1903).

OLD AGE, Diseases of. See Senility.

OLD-AGE PENSIONS. Regular payments

or allowances to aged persons, paid by a government, corporation, or private employer. In strict usage the term is limited to allowances paid without previous contribution on the part of the recipients, but it is commonly extended to include also allowances to aged persons where the cost is covered only in part by such contributions.

The grant of old-age pensions by the state is one possible method of solving the problems arising from dependency in old age. The existence of a large class of aged persons who are paupers or just on the border line between poverty and pauperism has brought the question into prominence. Most of them are workingmen, a large majority are poor not because of any fault of their own, but because of misfortune or because there was no chance to save anything for their old age. Advocates of old-age pensions hold that workers who have spent their best years in work in the industries of a state should not be abandoned to their own resources or forced to endure the stigma of pauperism after their working strength is gone. Opponents of pensions fear that the grant of state allowances would have a tendency to encourage pauperism and to discourage thrift among the working population and shrink before the heavy cost.

The measures taken by governments to solve the problem of old-age dependency may (1) encourage or subsidize thrift and leave the initiative of action entirely to the workman; (2) contributions may be required of workmen to defray all or part of the expense of pensions; or (3) pensions may be granted outright by the state without previous contributions of any kind from the pensioners. Special measures have been taken by the governments of Belgium, France, Italy, Spain, and New Zealand to encourage thrift. Compulsory insurance against old age is in force in Germany, Austria, France, and Sweden and for a limited circle of workmen in Hungary, Rumania, and Italy. Old-age-pension laws are in operation in Denmark, New Zealand, Australia, France, and England. Other countries have compulsory insurance for special groups of workers. Hungary requires miners to insure against invalidity and old age; Rumania requires workmen in industry and skilled workers to insure; Italy has a compulsory insurance law applying to seamen. Proposals for old-age insurance have been made in Norway, Belgium, and the Netherlands.

Encouragement of thrift is the simplest method of meeting the problem of old-age dependency. France and Belgium in 1850 established Old Age Pension Institutions, where workmen could deposit their savings in the purchase of old-age annuities. In France, beginning in 1891, small direct subsidies were granted to the mutual associations, and in 1895 a more extensive system was inaugurated of subsidies to needy pensioners. The number of depositors in 1910 was approximately 1,900,000. About 30 per cent were accounts of minors, 65 per cent of laborers, and 5 per cent of artisans, merchants, and professional men. In 1908 there were 322,240 pensions averaging $24.14. This is considerably lower than the average of 1891 ($34.48). The decrease is due largely to the elimination of the older pensioners, who represented the class of small capitalist depositors of an earlier period.

Australia. Old-age-pension legislation came into force in Victoria in 1901, in New South Wales in the same year, and in Queensland in 1908. These Acts were superseded by the law of the Commonwealth of Australia passed in 1908, in effect July 1, 1909. The pension age since 1910 is 65 for men, 60 for women. Twenty years' residence in the Commonwealth is required. The rate of pension is fixed by the pension commissioners at what is deemed reasonable and sufficient for the special case. It must not exceed $130 a year, nor must it be at such a rate that the pensioner's total income, including the pension, exceeds $260. Payments received as benefits from a friendly society, trade-union, or other association are not treated as income. The pension is subject to $5 deduction for every complete $50 by which the net capital value of the pensioner's property exceeds $250. If both husband and wife are pensioners, the deduction is $5 in the case of each of them for every complete $50 by which the capital value exceeds $125. The value of a home is deducted from the net capital value of property. No person shall receive a pension unless he is of good character. There were 82,943 pensioners in 1913, representing 34 per cent of the population over 65.

Austria followed the example of Germany in 1906 in establishing compulsory insurance against invalidity and old age. The measure does not apply to the working class, but only to the better paid or salaried employees. Contributions are graded according to six salary classes.

SALARY CLASS	Monthly premium	Employee pays	Old-age pension
I. $121.80–$182.70...	$1.22	⅓	$36.54
II. $182.70–$243.60...	1.83	⅓	54.81
III. $243.60–$365.40...	2.44	⅓	73.08
IV. $365.40–$487.20...	3.65	⅓	109.62
V. $487.20–$609.00...	4.87	½	146.16
VI. $609.00 and over..	6.09	½	182.70

Every employee receiving an annual salary of over $121.80 in the occupations subject to insurance is compelled to contribute beginning with the age of 18. After 480 months of contributions, or 40 years, he is entitled to a retirement or old-age pension. By postponing the date of the commencement of the allowance he may draw a correspondingly larger pension. Contributions are paid in first instance by the employer, who is authorized, as in Germany, to deduct the share of the employee from his wages.

Belgium. The Old Age Pension Institution of Belgium was at first little more than a savings bank authorized to sell old-age annuities. In 1890 members of mutual-aid societies were granted subsidies on deposits for old-age pensions. Beginning in 1900, a liberal state subsidy was offered. All persons depositing up to 15 francs ($3) a year received a subsidy of two-fifths of the amount. The maximum aid was 9 francs ($1.80) a year. For persons over 40 at the time of the passage of the law this maximum was set at 14.40 francs ($1.92). In 1903, to encourage deposits of workmen in the higher age classes, new inducements were offered. The state was to give a subsidy of 100 per cent on the first 6 francs deposited annually by persons 40–45 years of age on Jan. 1, 1903, of 150 per cent for persons 45–50, and 200 per cent for persons over 50. A deposit account in the National Old Age Pension Institution was made a condition of receiving an old-age pension granted by the Law of 1900. This provision applied only to persons born between 1843 and 1845, though it was later extended to include those born in 1846–48.

Under the influence of the subsidy grants the number of depositors increased rapidly. From 1890 to 1899 the accounts increased from 10,200 to 168,800; in 1908 there were approximately 1,000,000. About one-seventh of the total population of Belgium is thus enrolled. The largest increase in the number of new accounts opened was in 1900, 1901, and 1903, due evidently to the new subsidies. One potent factor in the increase was the formation of school societies and deposits made by pupils. From one-third to one-half of all new depositors from 1900 to 1908 were persons under 18 years of age; the agitation in the schools commenced in 1896, but did not produce appreciable results till 1897 and 1898. Disregarding minors under 18, approximately nine-tenths of the depositors were of the working class.

Denmark in 1891 enacted a law providing old-age pensions for the needy and deserving aged poor. The age limit is placed at 60. The applicant must be unable to provide the necessaries of life, or proper treatment in case of sickness, for himself and those dependent upon him. Safeguards are placed about the grant of pensions to exclude the undeserving. The applicant must "not have undergone any sentence for any transaction generally accounted dishonorable and in respect to which he has not reached rehabilitation." His poverty müst not be due to his own fault, either because of spendthrift or dissolute habits or because of making over his property to his children or to others. He must for 10 years have had a fixed residence, must not have been sentenced for vagrancy or mendicancy, and he must not have received poor relief during this time.

The amount of the pension is not fixed by law, but is adjusted to the needs of the pensioners. The communal authorities investigate the condition of each applicant and fix the amount necessary. The standards in city and country and from city to city vary greatly. The average pension in rural communes in 1906–07 was 95.66 kroner ($25.60), in Denmark as a whole $31.80, in Copenhagen $43.50, and in Frederiksberg $52.40. To make each commune interested in keeping as low as possible the expense of pensions, one-half of the cost is placed upon them directly, and the other half is paid by the state. The number of pensioners increased from 43,826 in 1892 to 79,289 in 1910, and the expense from $700,000 to $3,120,000. About one-fourth of the population over 60 and one-third of the population over 70 are pensioned. Receipt of an old-age pension does not involve any civil disabilities and is thus sharply distinguished from poor relief. Pensioners still keep the right to vote, but paupers are denied the suffrage.

France. In 1894 compulsory insurance against old age and invalidity was applied to the mining industry of France. In 1906 France enacted a law providing pensions for the aged deserving poor. No definite pension was prescribed; the communes are authorized to determine the level of pensions in their own districts. The minimum is placed at $12 a year, and the maximum, except in the large cities, is $48. Frenchmen over 70 who are unable to work may receive pensions. The cost is divided between the communes, the departments, and the state. In 1911 there were 398,811 old-age pensioners over 70; 107,959 invalid pensioners from 60 to 69; besides 104,567 persons from 65 to 69 receiving aid under the special provision of the compulsory insurance law of 1910. Nearly 21 per cent of the population over 70 are pensioned.

In 1910 was enacted a compulsory insurance law applicable to the entire working population in industry and agriculture. The principal points of divergence from the German system are three. The emphasis in the French law is on provision for old age rather than for invalidity, while in Germany old age is treated as prima-facie evidence of invalidity. The French system divides the workers into rough age and sex groups instead of salary classes. Children under 18 pay 4.50 francs ($0.90) a year, women pay 6 francs ($1.20), and men pay 9 francs ($1.80), or, in other words, 1½ centimes, 2 centimes, and 3 centimes per working day respectively. A third difference is in the administration. Instead of requiring workmen to insure in one state institution as is the case in Germany, the French system allows payments to be made through mutual-aid societies, employers' pension funds, private guaranty associations, trade-union funds, as well as through government institutions and through the National Old Age Pension Institution. Both systems require equal contributions from employer and employee, and both give a state supplement to the allowance ($12.50). The pension age in France is 65. The amount of the pension depends on the number and amount of premiums paid. A person insured at 12 would receive at 65 a pension of 414 francs ($82.80); one insured at 15, $76.40; at 20, a pension of $66.

Much resistance on the part of the syndicalists was offered to the execution of the compulsory law. They objected to the deduction of their premiums from their wages. The law itself was not clear on the question whether the employers had the right or were required to deduct the premiums of the workmen from their wages. The confusion was made worse because the administration was a little doubtful on the question and at first ordered the employers to pay the premiums and then submitted the matter to the courts for interpretation. In the meantime the number of premiums paid in fell far below the estimates, and it was only in the course of two years that the law was put into effective operation.

Germany was the first country to institute general compulsory insurance for old age for the working class. A law of 1854 had required insurance against invalidity and old age in the mining industry. In 1889 a law was passed, taking effect in 1891, extending the principle of compulsion to include nearly the entire working population. All workmen over 16, whether engaged in mines, factories and workshops, transportation, or agriculture, must contribute if their wages are less than 2000 marks ($500) a year. Foremen, shop assistants, members of theatrical companies, teachers and tutors, and all crews on German ships are likewise subject to insurance. Outworkers except those in the textile and tobacco trades are not required to insure. Those whose income does not exceed $750 a year may insure voluntarily.

The cost of the pensions is defrayed by the employer, employee, and the state. Employer and workmen contribute equally on a scale dependent on the wage of the latter, and the state adds 50 marks ($12.50) to each pension. Pensions are granted to persons over 70 years of age who have made at least 1200 weekly contributions, extending over a period of 30 years.

In order that those already 70 or nearly 70 should not be totally excluded from the enjoyment of pensions, special temporary provisions were made. Those already 70 or over in 1891 were granted allowances if they could prove that they would have been subject to insurance for the three years prior to the passage of the law or prior to reaching the age of 70. Those over 40 could qualify for a pension by paying contributions from the time of the passage of the law till they arrived at the pensionable age. These transition conditions approach very closely to a straight old-age pension by the state, at least for those who were over 70 in 1891.

The amount of the pension varies with the wage class and with the amount of the contributions to the credit of the worker. The following table shows the pension and the weekly premium payable in each wage class.

WAGE CLASS	Old-age pension	Weekly premium
I. Less than $87.50 annual wage..	$27.50	$0.04
II. $87.50–$137.50..............	35.00	.06
III. $137.50–$212.50.............	42.50	.08
IV. $212.50–$287.50.............	50.00	.10
V. $287.50–$500.00 and over.....	57.50	.12

It should be noted that the old-age-pension feature of the German law is quite subordinated to the invalidity pension.

In 1891, 132,957 old-age pensions were granted under the transitional conditions. Nine per cent of the population over 70 were pensioned. In 1897 the number of pensioners had nearly doubled. Since that time it has steadily fallen off till there are now (1913) but 87,261 old-age pensions current. In the same year there were 998,339 current invalidity pensions. The decrease in old-age pensioners is due to the increasing substitution of invalidity benefits. On the average the pension for invalidity is higher, so that, if a person over 70 cannot earn one-third of the usual wage, he prefers to qualify for an invalidity rather than for an old-age pension.

The average old-age pension increased from $31 in 1891 to $41.08 in 1910. Twenty-four per cent of the total population and 95 per cent of the wage-earning population are insured against old age and invalidity.

Besides the general insurance legislation applying to the workingmen or poorly paid laborers, there is special legislation passed in 1911 for insurance against old age and invalidity applying to the salaried employees. Clerks, teachers, actors, musicians, officers of the mercantile marine, who are not classed with the working population, are required to contribute to the old-age-pension fund. Employers pay amounts equal to those of their employees, but there is no contribution by the state. There are nine salary classes with graded monthly contributions.

All salaried employees receiving less than $1250 a year are required to contribute. Contributions must have been paid for a period of 10 years to establish a claim to an allowance. The annual pension granted is equal to one-fourth of the contributions of the first 10 years plus one-eighth of all additional payments. Pensions are payable at invalidity or at the age of 65.

YEARLY SALARY	Joint monthly contribution	ANNUAL PENSION AFTER		
		10 years	25 years	50 years
I. Less than $137.50	$0.40	$12.00	$21.00	$56.00
II. $137.50–$212.50 .	.80	24.00	42.00	72.00
III. $212.50–$287.50 .	1.20	36.00	63.00	108.00
IV. $287.50–$375.00 .	1.70	51.00	89.25	153.00
V. $375.00–$500.00 .	2.40	72.00	126.00	216.00
VI. $500.00–$625.00 .	3.30	99.00	168.25	297.00
VII. $625.00–$750.00 .	4.15	124.50	217.87	373.50
VIII. $750.00–$1,000.00	5.00	150.00	262.50	450.00
IX. $1,000–$1,250.00.	6.65	199.50	344.12	598.50

Great Britain. The English old-age-pension law went into effect in 1909. It provides for the payment of a pension not exceeding $1.25 a week to needy and deserving persons over 70 years of age. Those whose incomes exceed $157.50 per year are disqualified. The allowance is graded according to income as follows: when the yearly means of the pensioner do not exceed $105, the weekly pension is $1.25; the pension is $1 if the income is between $105 and $115.12; $0.75 if between $115.12 and $131.25; $0.50 if between $131.25 and $143.37; and $0.25 if between $143.57 and $157.50. Twenty years' residence in the United Kingdom is required, and there are certain requirements as to good character.

Almost all of the pensions are for $1.25 a week. In 1913 there were 967,921 pensions current in the United Kingdom. Approximately 57 per cent of the population over 70 in England and Wales (1911) were pensioned, while the proportion in Ireland was higher still—68.4 per cent. More persons applied for and received pensions in Ireland in 1909, the first year after the law was in force, than there were persons over 70, according to the estimates based on the previous census figures. A curious increase took place in the proportion of persons over 70 in the census of 1911. The pension act was amended in 1911. One principal change permitted the grant of pensions to persons already in receipt of relief. It was hoped by this to permit many who had been forced to seek relief to dispense with it. The results have been disappointing. The small amount of the pension scarcely permits a person who has no other means of his own to maintain himself, and very many of those who at first left the poor-relief to live on their allowances have found their way back to the poorhouse.

Italy has sought to encourage saving for old age on the part of her working population since 1899 (Act of July 17, 1898). Deposits made by workingmen for the purchase of old-age annuities are subsidized not to exceed 10 lire per person. No definite subsidy is promised. The government set apart 10,000,000 lire, the interest of which, together with certain other sources of revenue, may be used for subsidies. No subsidy is given on deposits of less than six lire ($1.20). Old-age pensions are granted at the age of 60 (for women 55) after 25 years of contributions; the amount depends on the amount of the deposits plus the subsidies to the credit of the pensioner. The total number of accounts reached 352,376 in 1910. A large proportion of the depositors fail to contribute regularly. Of 11,463 insured persons on the books in 1900, 25 per cent failed to contribute in 1901; the figures for 1902 and 1903 were 25 and 30 per cent respectively. A very large proportion paid in only the amount necessary to secure the subsidy: 42 per cent in 1900, 45 per cent in 1901, and 30 and 31 per cent in 1902 and 1903 deposited only the minimum of six lire.

New Zealand in 1910 passed a law establishing a National Provident Fund to encourage by liberal subsidies the voluntary accumulation of savings for old age. It is interesting as an attempt to encourage saving to supplant or supplement the old-age pensions now granted by the state. The subsidy amounts to 25 per cent of the contributions. In New Zealand the deserving aged poor have enjoyed pensions since 1898. The age limit is 65 years. The original act provided for a pension of £18 ($90), but this sum was increased to $130 a year, or $2.50 a week, by the amendment of 1905. The act applies to all residents of New Zealand except Maoris, Chinese, and other Asiatics, aliens, and naturalized subjects who have not been naturalized one year. The principal qualifications are: 65 years of age, 25 years' continuous residence in New Zealand, good character; the yearly income must not exceed $300, and the net value of accumulated property must not exceed $1300. Good character is defined carefully. The applicant must not have been punished during the previous 12 years by imprisonment for four months or on four occasions for an offense punishable by 12 months' imprisonment. He must not have been punished during the previous 25 years by imprisonment for five years for any offense. He must not have deserted wife or child during the past 12 years. During the year immediately preceding the application he must have lived a sober and respectable life. Furthermore the applicant must not have deprived himself of any property in order to qualify for a pension.

Payments are made through the post office. The full pension of $130 is reduced by $5 for every complete $5 of income over $170 enjoyed by the pensioner and for every complete $50 of his net accumulated property. The income is that of the previous year. Net accumulated property is the capital value of all real and personal property owned by an applicant other than life-assurance policies and annuities, less (1) the amount of the mortgage existing on the property, (2) $1700 from the value of the home, including furniture and personal effects, and (3) $250 from any other property.

In 1912, 16,649 persons were pensioned, at a cost of $2,031,280, or $37.50 per capita of population. Of the population over 65 years of age, 33.6 per cent were pensioned.

Spain has followed the example of the other Latin countries by establishing a National Old Age Pension Institution in 1908.

Sweden enacted a compulsory old-age insurance law in 1913. It applies to the entire population, male and female, between the ages of 16 and 67, with the exception of state officials and others who have claims on state pensions. The contribution is payable once a year at the same time as the tax is levied. The amount of the contribution varies with the income as follows:

ANNUAL INCOME	Tax	ESTIMATED NUMBER IN EACH GROUP	
		Men	Women
I. Under $134.....	$0.80	643,000	1,235,000
II. $134–$214......	1.34	300,000	100,000
III. $214–$321......	2.14	273,000	53,000
IV. $321 and over...	3.48	180,000	22,000
		1,396,000	1,410,000

The annual pension is payable at the age of 67; men receive 30 per cent of the total contributions paid in as an annual allowance, women 24 per cent. In addition the state gives a subsidy to pensioners who are invalids and whose annual income does not exceed 300 kroner ($81) (for women 280 kroner). If the income does not exceed $13.50, a subsidy of $40.50 (for women $37.80) is granted; if the income exceeds $40.50 but not $81, one-half of the amount of the yearly income received is deducted from the subsidy. If the income exceeds $81, one-half of the amount of the yearly income received is deducted from the state subsidy. Three-fourths of the cost of the subsidy is paid for by the state and one-fourth by the local communes. Special provisions apply to those already over or nearing the age of 67.

United States. Almost all countries except the United States give retirement pensions to the employees of the civil service.

In the United States provision for aged employees is left almost entirely to the employees themselves or to their employers. Many large railroad and industrial corporations pension their aged employees. The Baltimore and Ohio Railroad was the first to establish a fund for the retirement of superannuated workmen in 1884. Since 1898 there has been a general extension of the movement for pensions among big corporations. The following railroads have established pension systems: the Baltimore and Ohio; the Chicago and Northwestern; the Chicago, St. Paul, Minneapolis, and Omaha; the Delaware, Lackawanna, and Western; the Houston and Texas Central; the Illinois Central; the Oregon Short Line; the Pennsylvania; the Philadelphia and Reading; the Rock Island; the Southern Pacific; the Union Pacific; and the New York Central lines, etc. Altogether railroads with an aggregate of 45 per cent of the mileage of the country provide for the retirement on a pension of their superannuated employees. A total of nearly 900,000 men are employed on these roads.

The main features of the plan of retirement in the different systems are very similar. Optional retirement is usually permitted at 65, and retirement is compulsory at 70. The pension is usually 1 per cent of the average salary of the last 10 years preceding retirement for each year of service. After 30 years' service the employee would receive 30 per cent of the average salary of the last 10 years of employment. A long period of service on a single railroad is usually required. Persons entering the service after 40 or 45 are excluded from the pension benefits. No contributions from the employees are required in most of these funds. The pensioner has no legal right or claim to a pension. The railroads reserve the right to modify or withdraw the pensions at any time.

Among the large industrial companies which have organized retirement funds for their employees may be mentioned the International Harvester Company, the Standard Oil Company, the United States Steel Corporation (the Carnegie Relief Fund), and the Western Electric Company. Mr. L. W. Squier in 1910 sent inquiries to 1000 of the largest employers of labor in the country and secured details of 29 systems of old-age pensions of various industrial corporations. The Massachusetts Commission on Old Age Pensions found four corporations in the State with regular pension systems, though several other companies reported the occasional retirement on pension of an aged employee. The main features of the systems are like those established by the railroads. Some of them provide for partial contributions by the employees.

A very few trade-unions have made provision for allowances to aged members. An investigation in 1908 by the Bureau of Labor showed of 1200 benefit funds only four that paid superannuation benefits. Four more planned to establish such allowances.

Some fraternal organizations give old-age benefits or care for their aged members in old-age homes. Forty-two out of 182 fraternal benefit societies of a national character promise old-age benefits. The actuarial basis of such schemes has usually been inadequate, and many States have prohibited them from issuing old-age insurance.

Pension systems have been established by municipal, State, or Federal governments only to a limited extent. In 1910 there were 48 retirement funds for teachers in the United States. Six States—Connecticut, Massachusetts, Maryland, New Jersey, Rhode Island, and Virginia—have such funds. Forty-one municipalities have a regular retirement system. Of the 25 largest cities all except one have pensions for teachers. Some provision is made for policemen and firemen. There were, in 1910, 167 funds for policemen and firemen, mostly local.

Massachusetts enacted in 1907 a law providing for the sale of old-age insurance through the savings banks at cost to workingmen. Old-age-pension policies are offered with pensions to begin at 60 and 65 with or without the return of premiums paid in if death occurs before the pension begins. The maximum policy is limited to $200. In 1913 there were 93 deferred annuities in force, representing annual payments of $11,897. Wisconsin enacted a similar law in 1911.

The only comprehensive pension system in the United States is the military and war pensions. Most of the survivors of the Civil War are over 65, so that a large proportion of the Federal pensions go to the aged population. Estimating that 60 per cent of them are received by persons over 65, 13 per cent of the total population over 65 in 1910 were pensioned. According to the figures of the Massachusetts Commission, 17.6 per cent of the population over 65 in that State were United States pensioners. The number is now rapidly declining.

The fact that no old-age-pension system has been introduced in the United States may be explained in part by the following circumstances. 1. The population over 60 and 65 represents a smaller proportion of the total population. The United States in 1900 had 6.4 per cent over 60; England and Wales had 7.4 per cent; Sweden, 11.3 per cent; and France, 12.5 per cent. 2. A much smaller proportion of the aged are paupers or near the pauper line. Of the aged population over 65 in Massachusetts in 1909, 31.7 per 1000 were paupers; 172 per 1000 in the United Kingdom were so classed. 3. The United States is still predominantly agricultural. Persons do not become superannuated as early in agriculture as in industry. The proportion of the aged who are paupers in the different States increases with the degree of industrialization of the State. The agricultural population of the higher ages is still almost exclusively a landowning population; the agricultural laborers of an earlier day have become first tenant farmers and then have worked up to farm ownership.

Special problems which would have to be solved in old-age-pension legislation in the United States would be: 1. Equalization of the burden on different States. Vermont has 8.2 per cent of her population over 65, Wyoming only 1.9 per cent. 2. Migration between States of the population approaching the pension age if the system were not uniform in the different States. A Federal system would obviate these difficulties. 3. The treatment of the aged negro. Only 3 per cent of the negro population are over 65 as contrasted with 4.3 per cent of the total population. The death rate of the negro population is heavier. 4. Pensioning of women. Two-thirds of the pensions of England are paid to women; 70 per cent of the old-age pensions of Germany were paid to men (1891). 5. Amount of the pension. Owing to the higher standards of life in America a pension would have to be more liberally measured than in European countries. The average German pension of $41 a year or the English pension of $65 would be woefully inadequate according to American standards.

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OLD ARAD. See Arad.

OLD ARMCHAIR, The. A poem by Eliza Cook, set to music by Henry Russell.

OLD BAILEY (probably from OF. *baille*, palisade, inclosure, probably from Lat. *baculum*, rod). An ancient criminal court, with a prison adjoining, in London, England. It attained a gruesome reputation at a time when many crimes other than murder were punishable with death, because of the great number of convictions there for capital offenses and the apparent eagerness of the judges and juries serving there to convict any accused person brought to trial. It was graphically described by Charles Dickens in his *Tale of Two Cities* as the scene of the trial of the hero, Charles Darnay, for treason. It was destroyed by fire during the Gordon Riots of 1780, but was rebuilt, and is now officially known as the Central Criminal Court, though still popularly called the Old Bailey.

OLDBERG, ōld′bĕrg, Arne (1874–). An American composer and pianist, born at Youngstown, Ohio. He studied piano with Leschetizky in Vienna and composition with Rheinberger in Munich. In 1899 he was appointed professor of music in Northwestern University. He wrote two symphonies, in F and C minor; a festival overture; an overture, *Paolo and Francesca;* a cello concerto; a piano concerto; a horn concerto; an organ concerto; and a number of meritorious chamber-music works.

OLD BULGARIAN. See Old Church Slavic Language and Literature.

OLD′BURY. A manufacturing town and urban district in Worcestershire, England, 5 miles west of Birmingham (Map: England, E 4). It is known for its production of large lenses as used in lighthouses; also iron, steel, hardware, railway equipment, bricks, glass, and chemicals. The town owns its gas supply, a free library, and a technical institute. Pop., 1901, 25,191; 1911, 32,232.

OLD CALABAR RIVER. See Calabar River.

OLD CALATRAVA. See Calatrava la Vieja.

OLD CALIFORNIA. See California, Lower.

OLD′CASTLE, John (?–1417). An English nobleman, who suffered death as a Lollard. He was born about the time of the accession of Richard II (1377), probably in the Manor of Almeley, near Weobley, western Herefordshire. He acquired the title of Lord Cobham by marriage (1409), and later signalized himself by the ardor of his attachment to the doctrines of Wiclif. He took part in the presentation of a remonstrance to the English Commons on the subject of the corruptions of the Church. At his own expense he had the work of Wiclif transcribed and widely disseminated among the people, and paid a large body of preachers to propagate the views of the reformer throughout the country. During the reign of Henry IV (1399–1413) he commanded an English army in France, and forced the Duke of Orléans to raise the siege of Paris; but in the first year of the reign of Henry V (1413) he was accused of heresy and was imprisoned in the Tower, whence after some time he escaped and became concerned in plots against the state. A bill of attainder was passed against him and 1000 marks set upon his head. After four years' hiding in Herefordshire and Wales he was captured, brought to London, and, being reckoned a traitor as well as a heretic, he was hanged and his body consumed as it hung in chains over a fire, Dec. 14, 1417. He is said to have been the original of Shakespeare's Falstaff, as he was believed to have been in his youth the boon companion of Henry V in his early days. The account of his death is in Foxe's *Acts and Monuments*. Consult his *Life* by Gilpin (London, 1765), Gaspey (ib., 1843), Brown (ib., 1848), and in Maurice's *English Popular Leaders* (ib., 1872).

OLDCASTLE, John. A pen name occasionally assumed by Wilfrid Meynell (q.v.).

OLD CATHOLICS. A religious communion found principally in Germany and Switzerland, which is in essence a continuation of the ancient conflict between episcopacy and the monarchial papacy. The Old Catholic churches owe their origin to certain Roman Catholics who refused to accept the dogma of infallibility passed by the Vatican Council (q.v.), July 18, 1870. Before the council assembled it was known that such a dogma would be discussed, and a determined opposition to it developed. Foremost among the opponents was the Munich professor Ignaz von Döllinger (q.v.), and after the dogma was promulgated he headed a gathering at Nuremberg, Aug. 27, 1870, of professors from Bonn, Breslau, Braunsberg, Munich, Münster, Prague, Würzburg, and elsewhere, who sent forth a protest. The chief signers of the protest were deposed or excommunicated. Nevertheless they persisted in the advocacy of their belief and found sympathizers. On Sept. 22–24, 1871, the first Old Catholic congress met at Munich, attended by about 300 delegates from Germany, Austria, and Switzerland, and friends from Holland, France, Russia, England, and other countries. In the resolutions adopted the congress defined its theological status. Döllinger was not in favor of forming an ecclesiastical organization, but the majority determined upon it. A large number of Old Catholic congregations sprang up in many places in Germany. The second congress met at Cologne, Sept. 20–22, 1872; provision was made for the election of a bishop, intercommunion with the Eastern and Anglican churches was sought, and a claim to recognition by the state, with a share of the church property, was asserted. Joseph Hubert Reinkens (q.v.), professor of theology in the University of Breslau, was elected Bishop in the following June and consecrated in August at Rotterdam by Heycamp, Jansenist Bishop of Deventer. He continued to serve till his death, Jan. 4, 1896, when he was succeeded by Theodor Weber, who had been consecrated coadjutor bishop the preceding year. Old Catholic bishops have been recognized by the governments of Baden, Hesse, and Prussia, and the latter has granted them a share in the ecclesiastical property. The third congress, held at Constance, September, 1873, further perfected the organization, and in the following year the church was able to report 132 parishes and societies in Germany, with about 25,000 members, 41 priests, and 12 theological students. After the fourth congress (at Baden, 1874) a conference aiming at church unity was held at Bonn. Dr. Döllinger presided and representatives of the Eastern and Anglican churches participated.

The bishops of the Old Catholic church in Germany are chosen by the clergy and people together. Its synods are representative bodies having the initiative in legislation. It rejects the doctrines of infallibility and the immaculate conception, the obligation to confess, and priestly absolution. Indulgences and the veneration of saints are modified. Many ecclesiastical taxes are abolished, and the mass is recited in the vernacular. The priests are allowed to marry. Unions for church improvement and charitable work have been formed. Between 1887 and 1900, 800,000 marks were spent in church building. The Altkatholischer Press- und Schriftenverein had, in 1915, about 1500 members in about 200 places. The Altkatholischer Schwesternverein in Bonn maintains a deaconess work. The Amalie von Lasaulx Haus is a training institute for nurses at Essen. An orphans' home was founded at Bonn in 1897. There are at the present time from 50,000 to 60,000 adherents in Germany.

The movement early took root in Switzerland, especially in Geneva, and resulted in 1873 in the formation of the Christian Catholic church of Switzerland. Edouard Herzog (q.v.) was chosen Bishop in 1876. There are about 40 congregations and 50,000 adherents.

In Austria the Old Catholic church, owing to government opposition, was not organized till 1876. It had in 1915 about 25 parishes and upward of 16,000 members. The Old Catholic Union of Austria has been organized to promote the work of the church and has local branches in some of the larger towns. A sisters' home was established at Warnsdorf in 1899. The progress of the Old Catholic church in the Austrian Empire has been assisted in late years, particularly in Bohemia and Styria, by a popular movement whose battle cry is Los von Rom. It began with the publication in 1898 of a tract by an Old Catholic priest, Anton Nittel, of Warnsdorf. At first political motives influenced the movement, but it has assumed more of a religious character as it has gone on. At the international Old Catholic congress in 1902 Bishop-elect Czech said that 7000 members had been added to the church through the Los von Rom movement. In 1904 it was estimated that from 34,000 to 40,000 members in Bohemia, Moravia, Styria, Upper Austria, and other parts of Austria-Hungary had left the Church of Rome, of whom 9000 had joined the Old Catholic church and 24,304 the Lutheran.

In Holland the Jansenist church (see JANSENISM), which is affiliated with the movement, had about 8000 adherents. The Old Catholics have a small representation in Italy, and in Spain there are about 3000 adherents. In France the Gallican Church at Paris, founded by Père Hyacinthe (see LOYSON, CHARLES), now under the charge of the Bishop of Utrecht, is in sympathy with the movement. In England an organization was made in 1908, with A. N. Mathew as Bishop. There are also a few of the communion in Portugal and Mexico. The so-called Independent Catholic church in the United States (q.v.), founded by the Rev. Anthony Koszlowski among the Polish immigrants in Chicago, has been generally regarded as representing the movement in America. There have also been a few congregations in Wisconsin. Members of other Slavic races have organized a National Catholic church, in fellowship with the Old Catholic church of Europe. International Old Catholic congresses have been held at Cologne (in 1890), Lucerne (1892), Rotterdam (1894), Vienna (1897), and Bonn (1902).

A number of Old Catholic periodicals are published: the *Internationale theologische Zeitschrift* (*Revue internationale de théologie*), quarterly (Bern); *Amtliches altkatholisches Kirchenblatt*, occasional (Bonn); *Deutscher Merkur*, weekly (ib.); *Altkatholisches Volksblatt*, weekly (ib.); *Der Katholik*, weekly (Bern); *Le Catholique National*, weekly (ib.); *De Oud Katholiek*, monthly (Rotterdam); *Le Catholique Français*, monthly (Paris); *Il Labaro*, monthly (San Remo); *Girolamo Savonarola*, weekly (Piacenza); *La Luz* (Madrid).

The literature is voluminous. The reports of the congresses, synods, etc., the pastoral letters, addresses, and other publications of the bishops and leaders, and the periodicals, particularly the *Deutscher Merkur*, give detailed information of the progress of the work. For its origin, consult: E. Friedberg, *Sammlung der Aktenstücke zum ersten vatikanischen Konzil* (Tübingen, 1872); C. J. Loyson, *Catholic Reform* (London, 1874); E. Friedberg, *Aktenstücke, die altkatholische Bewegung betreffend, mit einem Grundriss der Geschichte derselben* (Tübingen, 1876). Consult, also: E. Herzog, *Beiträge zur Vorgeschichte der christkatholischen Kirche der Schweiz* (Bern, 1896); Friedrich Nippold, *Die Anfänge der christkatholischen Bewegung in der Schweiz und der Los-von-Rom Bewegung in Oesterreich* (ib., 1901). For the history of the movement, consult J. F. von Schulte, *Der Altkatholizismus* (Giessen, 1887), and id., "Altkatholizismus," in Hauck-Herzog, *Realencyclopädie*, vol. i (3d ed., Leipzig, 1896), which is complete and authoritative for Germany to 1896; A. M. E. Scarth, *The Story of the Old Catholic and Kindred Movements* (London, 1883). Hergenröther, *Handbuch der allgemeinen Kirchengeschichte*, vol. ii (3d ed., Freiburg, 1884), treats the movement from the Roman Catholic standpoint. A popular account in English may be found in an article by Beyschlag, "The Origin and Development of the Old Catholic Movement," in the *American Journal of Theology*, vol. ii (Chicago, 1898).

OLD CHURCH SLAVIC LANGUAGE AND LITERATURE. The oldest language and literature of the Slavic group of Indo-Germanic languages, presenting one of the most important dialects for the study of comparative linguistics. (See PHILOLOGY.) Formerly called Old Slovenian, and even now frequently termed Old Bulgarian, the best name seems to be Old Church Slavic, for the language appears not to have coincided with any national or geographical division, while its use from an early time in the Greek church (where it still occupies a position somewhat analogous to Latin in the Roman Catholic church), and its evident Slavic characteristics, amply justify the use of this term. The place of its origin cannot be exactly determined, although it seems to have been the dialect of a region in the Balkan Peninsula. The widespread use of the language, however, permitted the incorporation of certain Pannonianisms and Bohemianisms or Slovenianisms, even in the oldest records. It nevertheless remained free from the Russian, Servian, and other importations which characterize the later form of the language which may be called Church Slavic and which was still used as a written language in Russia in the first part of the eighteenth century and in Servia, Bulgaria, and Rumania as late as the beginning of the nineteenth century.

In its phonology Old Church Slavic adheres closely to the characteristic representations of the Indo-Germanic sound system which mark the Slavic languages (q.v.).

The inflection of Old Church Slavic is full and in many cases primitive in type. The noun has three numbers, singular, plural, and dual; seven cases, nominative, genitive, dative, accusative, vocative, locative, and instrumental; and three systems of declension, nominal, pronominal, and compound. There are six nominal declensions, according as the stems end in *-o*, *-ā*, *-i*, *-u*, *-ŭ*, or a consonant. As in other Indo-Germanic languages, the pronominal declension was originally entirely different from the nominal, although transfers from one system of inflection to the other are not infrequent. The compound inflection, peculiar to the Slavic and Scandinavian languages, is formed by adding the pronoun *i* to an adjective or a participle, both parts of which are then declined, as *dobra*, of good (man), *yego* of him, *dobrayego*, of the good (man). The process, therefore, is precisely analogous to the Scandinavian article suffixed to a noun, as Old Icelandic *borþs-ens*, of the shield. The comparative of the adjective is formed by *-yĭs*, *-ĕyis*, as *krēpŭkŭ*, strong, *krēpyii; dobrŭ*, good, *dobrĕi;* and the superlative is either the comparative used with superlative force or is formed by prefixing *nai-* to the comparative, as *naikrēpyii*, strongest. The verb in Old Church Slavic, as in other languages of this group, is either perfective, expressive of a completed action, or imperfective, denoting either a continuous (durative) or interrupted (iterative) action. A durative verb becomes perfective if a preposition is prefixed (as *nesti*, to carry, but *iznesti*, to carry out), while under like conditions an iterative verb becomes durative or more rarely iterative-perfective. Only two of the original tenses are retained, present and aorist, and only two moods, indicative and imperative, the latter being originally an optative. The Indo-Germanic middle voice has been lost, like the future and perfect tenses, while of the original passive only the present and perfect participles (as *vedomŭ*, *vedenŭ*, from *vesti*, to conduct) remain. In addition to the active infinitive there is a supine corresponding precisely to that found in Latin (as Latin *datum*, OChurch Slav. *datŭ*, from *darc*, *dati*, to give). The aorist, inherited from the Pre-Indo-Germanic period, is formed either with or without *s*, the latter class steadily increasing at the expense of the former. The imperfect is specifically a Slavonic formation, being made apparently by adding to a datival (or possibly locatival) infinitive an augmented imperfect of the root *as*, to be, as *vedĕachŭ*, *vedĕchŭ*, from *vesti*, to conduct. The future and perfect, like the pluperfect, future perfect, passive, and conditional, are periphrastic in formation, although the future is often expressed by the present, and the passive by a reflexive made by the active with the reflexive pronoun *se*, himself (as *otŭ tebe krĭstiti se*, to be baptized by thee, more rarely *bĕ napĭsano*, it was written). In syntax the most noteworthy features are the use of the genitive instead of the accusative after negative verbs and after transitive verbs in the case of proper names, a usage which probably arose from the desire to avoid the ambiguity resulting from the identity of form of the nominative and accusative singular of masculine nouns; the use of the dative as an absolute case, and the use of the predicative dative after verbs of becoming (as *i siroloyą dĕtištĭ ne bądetŭ*, and the child shall not become an orphan).

Old Church Slavic is written in two alphabets, called Glagolitic and Cyrillic. (See GLAGOLITSA; CYRILLIC ALPHABET.) The oldest manuscripts of this language date from the end of the tenth or the beginning of the eleventh centuries. The literature, which is of considerable extent and consists altogether of translations, is entirely religious. Besides the Bible there are versions of the Euchologium, homilies, legends of saints, some apocryphal books, and various liturgical pieces by Cyril and Methodius, apostles to the Slavs in the middle of the ninth century.

Bibliography. Among the best grammars the following deserve to be noted: August Schleicher, *Formenlehre der kirchenslavischen Sprache* (Bonn, 1852), a pioneer work that is still of great value; Meillet, *Recherches sur l'emploi du génitif-accusatif en vieux slave* (Paris, 1897); *Etudes sur l'étymologie et le vocabulaire du vieux slave* (ib., 1902–05); J. J. Mikkola, *Urslavische Grammatik* (Heidelberg, 1913); Friedrich Wiegand, *Bulgārische Grammatik* (Leipzig, 1908); August Leskien, *Grammatik der altbulgarischen (altkirchenslavischen) Sprache* (5th ed., Weimar, 1909); V. Jagić, *Entstehungsgeschichte der kirchenslavischen Sprache* (Berlin, 1913); Wenzel Vondrāk, *Altkirchenslavische Grammatik* (2d ed., ib., 1914). For a comparative grammar of the Slavic languages, the reader is referred to Wenzel Vondrāk, *Vergleichende slavische Grammatik* (Göttingen, 1908); and Meillet, *Introduction à l'étude comparative des langues indo-européennes* (3d ed., Paris, 1913). A good chrestomathy may be found in Leskien's *Grammatik* noted above and in Wenzel Vondrāk, *Kirchenslavische Chrestomathie* (Göttingen, 1910). As for dictionaries Franz Miklosich, *Lexicon Linguæ Slovenicæ Veteris Dialecti* (Vienna, 1850), as well as his *Lexicon Palæoslovenicum-Græco-Latinum* (ib., 1862–65), though antiquated, are still among the best works on the subject obtainable. A more recent work is Erich Berneker, *Etymologisches Wörterbuch der slavischen Sprachen*, a compendious work, which, though begun in 1908, is yet (1915) unfinished. The first volume (A–L) was published in 1913 (Heidelberg). Other works of value are: Slonski, *Die Uebertragung der griechischen Nebensatz konstruktionen in den altbulgarischen Sprachdenkmälern* (Kirchhain, 1908); V. Jagić, *Geschichte der slavischen Philologie* (Berlin, 1910); J. Peisker, *Grundlagen der slavischen Altertumskunde* (ib., 1910); Olaf Brock, *Slavische Phonetik* (Heidelberg, 1911).

OLD COLONY. The name given to the territory of the Plymouth Colony in Massachusetts.

OLD CURIOSITY SHOP, THE. A novel by Charles Dickens (1840). It appeared first as a serial in a weekly publication, *Master Humphrey's Clock*, but was published independently.

OLD DOMINION. Virginia. See STATES, POPULAR NAMES OF.

OLDEN, FANNY MORAN. See MORAN-OLDEN, FANNY.

OLDENBARNEVELDT, JAN VAN. See BARNEVELDT, JAN VAN OLDEN.

OLDENBERG, ŏl′den-bĕrk, HERMANN (1854–). A German Orientalist and philologist. He was born in Hamburg and was educated at Göttingen and Berlin. Upon graduation at the latter university he became privatdocent there and later professor extraordinarius. He was called to Kiel in 1889 as professor of Sanskrit and comparative philology. He published *The Dîpavaṁsa* (1879); *The Vinaya Piṭakaṁ* (5 vols., 1879–83); *The Theragāthā* (1883); "Vinaya Texts" and "Vedic Hymns," in *Sacred Books of the East* (3 vols., 1881–85; 1897); *Buddha, sein Leben, seine Lehre, und seine Gemeinde* (1881; 5th ed., 1906; trans. 1882); *Die Hymnen des Rigveda* (1888); *Die Religion des Veda* (1894); *Literatur des alten Indien* (1903); *Vedaforschung* (1905); *Indien und die Religionswissenschaft* (1906); essays on Indian and Iranian religion in *Die orientalischen Religionen* (1906); *Rigveda, textkritische und exegetischen noten* (1909); *Aus dem alten Indien* (1910), which contains three essays on Buddhism.

OLDENBURG, ōl′den-bụrk. A grand duchy of the German Empire, composed of the Duchy of Oldenburg and the two principalities of Birkenfeld (q.v.) and Lübeck. The Duchy of Oldenburg, which constitutes the bulk of the state, is bounded by the North Sea on the north, by the Prussian Province of Hanover and the State of Bremen on the east, and by Hanover on the south and west (Map: Germany, C 2). Total area, 2482 square miles. The Duchy of Oldenburg forms a part of the northwestern plain of Germany. It is low and marshy along the coast, where it has to be protected from the sea, while the interior, somewhat higher, is mostly sandy and largely occupied by moors and heaths. The region belongs to the basins of the Weser on the east and the Ems on the west. It is watered chiefly by the Hunte, a tributary of the Weser, and by the Haase and Soeste, both tributaries of the Ems. There are also a number of small streams flowing into the Jade, an inlet of the North Sea, and there is an extensive canal system for draining purposes.

The climate is mild, humid, and somewhat unhealthful in the marshes of the north. About three-fifths of the total area of Oldenburg proper has been brought under cultivation. The land is divided into small holdings, only 195 of the 62,520 holdings in 1907 containing over 100 hectares. The best land is found in the marshy districts on the north. They produce cereals for export and are famous for their excellent cattle. In the interior cereals are the chief product, and the proportion of uncultivated land is much greater. In 1913 there were under rye 75,482 hectares; oats, 39,224; potatoes, 18,027; hay, 90,761. The forest area is small. The manufacturing industries are developed but slightly, and the domestic system of production still largely prevails. The chief manufactures are tobacco, corks, woolen yarn, linoleum, brick, knit goods, etc. The Oldenburg state-railway system aggregated 674 kilometers in 1914.

The throne of the grand duchy is hereditary in the male line. The constitution, adopted in 1849 and revised in 1852 and 1909, provides for one chamber (Landtag), whose members (45) are elected directly for five years at the rate of one deputy for every 10,000 inhabitants. The Landtag assembles annually. The principalities of Birkenfeld and Lübeck have separate provincial diets. The executive power is vested in a responsible ministry representing the Grand Duke. Oldenburg is represented by one member in the Bundesrat, and returns three deputies to the Reichstag. For the administration of justice the Duchy of Oldenburg has a provincial court of appeal and a supreme court. The principalities of Birkenfeld and Lübeck are connected for judicial purposes with Cologne and Hamburg respectively.

The three divisions of the grand duchy have separate budgets, but there is also a common budget for the grand duchy, which derives its revenue from customs duties, state domains, and contributions from its constituent states. In 1914 the estimated revenue and expenditure were 17,126,300 and 17,181,355 marks respectively. Total public debt at the end of 1913, 81,136,919 marks. Population of the duchy in 1890, 279,008; in 1900, 318,434; in 1905, 353,789; in 1910, 391,246. The population of the grand duchy was 354,968 in 1890, 399,180 in 1900, and 483,042 in 1910. The census of 1910 showed that 76.94 per cent of the inhabitants were Evangelical, 22.26 Roman Catholic, and 0.32 Jewish. Capital, Oldenburg (q.v.), with 30,242 inhabitants; population of the city of Rüstringen, 47,592; Delmenhorst, 22,516. The inhabitants are mostly of Saxon stock, but there are also descendants of the Frisians in the north and west of the duchy.

History. The territory now included in the Grand Duchy of Oldenburg was in ancient times occupied by the Germanic tribe of the Chauci, who were subsequently merged with the Frisians. In the early centuries of the German Kingdom the dukes of Saxony held sway in the region. A Count of Oldenburg first appears about the beginning of the twelfth century. In 1247 Count Otho II founded the town of Delmenhorst, and his descendants were henceforth known as counts of Oldenburg and Delmenhorst. In 1448 Count Christian of Oldenburg became by election King of Denmark. Two years later he became King of Norway and in 1457 King of Sweden. The Reformation was early introduced into Oldenburg. After the death of Count Anthony Günther, without heirs, in 1667, the territories of Oldenburg passed to the royal houses of Denmark and Holstein-Gottorp jointly. In 1702 it came into the possession of Denmark alone. In 1773 Christian VII of Denmark transferred the principality to Paul, Duke of Holstein-Gottorp (the future Paul I of Russia), who immediately made it over to his cousin, Frederick Augustus, the Prince-Bishop of Lübeck. In 1777 Oldenburg was raised to the rank of a duchy. The present reigning family is descended from Duke Peter, of the line of Holstein-Gottorp. This Prince in 1808 became a member of the Confederation of the Rhine. He soon grew restive under the obligations imposed upon him by Napoleon and, abandoning the French alliance, left the country, which was thereupon (1810) annexed to the French Empire. The victories of the allies restored Peter to power in 1813. The Congress of Vienna increased the territory of Oldenburg and raised it to the rank of a grand duchy. The secularized see of Lübeck had been annexed to the principality in 1803. The revolutionary movement of 1848 affected Oldenburg, and in 1849, after having lived for centuries without even a show of constitutional or legislative freedom, the country entered suddenly into possession of the most liberal of constitutions. The reaction in favor of absolutism, which was brought about by the incapacity of the popular party, led in 1852 to a revision and modification of the constitution. In the Seven Weeks' War Oldenburg sided with Prussia and afterward joined the North German Confederation. In 1866 a treaty was concluded with Prussia, by which the Grand Duke renounced his claims to the Holstein succession in return for the cession of a small portion of Holstein territory and an indemnity. In 1871 Oldenburg became part of the new German Empire. In 1904 the succession was vested in the royal house of Schleswig-Holstein-Sonderburg-Glücksburg in order to provide against the failure of the Holstein-Gottorp line.

Consult: *Jahrbuch für die Geschichte des Herzogtums Oldenburg* (Oldenburg, annually); Kollmann, *Das Herzogtum Oldenburg* (ib., 1893); Erdmann, *Geschichte der politischen Bewegungen in Oldenburg* (ib., 1897); Pleitner, *Oldenburg im 19. Jahrhundert* (ib., 1899–1901); W. M. A. Schücking, *Das Staatsrecht des grossherzogtums Oldenburg* (Tübingen, 1911).

OLDENBURG. The capital of the Grand Duchy of Oldenburg, Germany, on the Hunte and on the Hunte-Ems Canal, 25 miles west by north of Bremen (Map: Germany, C 2). The church of St. Lambert, built in the thirteenth century and restored in 1874, contains the vaults of the reigning family. The palace, surrounded by fine gardens, has a fine stud, a choice collection of paintings and sculptures, and a library of 50,000 volumes. The city has a museum of natural history, a Gymnasium and higher Realschule, a teachers' seminary, and a public library of 133,000 volumes. There are manufactures of glass, cigars, leather, gloves, stoneware, machinery, and musical instruments. There is a trade in grain and cattle. Pop., 1900, 26,635; 1910, 30,242. Oldenburg is mentioned as early as 1108. It became a city in 1345.

OLDENBURG, House of. A princely family which has given rulers to a number of European countries. The family dates from 1088. Count Dietrich the Fortunate, of Oldenburg, married in 1424 the daughter of Gerhard VI, Duke of Schleswig-Holstein. His eldest son, Christian, was chosen King of Denmark (1448), of Norway (1450), and of Sweden (1457), and Duke of Schleswig-Holstein (1460), thus founding (1) the royal line of Denmark, which became extinct in 1863 in the person of Frederick VII. A younger son of Dietrich continued the line of Oldenburg, which became extinct in 1667. Adolph, son of Frederick I of Denmark, founded (2) the ducal line of Gottorp, whose representative, Duke Charles Peter Ulrich, ascended the Russian throne in 1762 as Peter III. A grandnephew of Peter III, Adolph Frederick, was chosen King of Sweden in 1751, while a younger brother of Adolph Frederick became the founder of the new ducal line of Oldenburg, which was made a grand duchy in 1815. (3) The ducal line of Sonderburg, founded by John the Younger, the third son of Christian III of Denmark, fell apart into a number of lines, of which the line of Augustenburg alone survives. (4) The line of Beck or Glücksburg was founded by a grandson of John the Younger. Prince Christian, fourth son of Duke William of this line, ascended the Danish throne in 1863 as Christian IX (q.v.). His second son, George, became in the same year King of Greece. Consult *Almanach de Gotha*, (Gotha, 1914).

OLD ENGLISH. See Anglo-Saxon Language and Literature; English Language; English Literature.

OLDENLANDIA. See Chay Root.

OLD EVREUX. See Evreux.

OLD-FASHIONED GIRL, An. A story by Louisa M. Alcott (1869). It was begun as a serial for *Merry's Museum*, a child's magazine, and afterward enlarged.

OLDFIELD, Anne (1683–1730). A noted English actress. Though she was of good birth her family was in humble circumstances and she was apprenticed to a seamstress in Westminster, till as a girl she attracted the attention of Farquhar by her beauty and her expression in reading a play. She was then given an opportunity at Drury Lane. At first the critics were doubtful of her dramatic gifts, but she made steady progress in her art and became the foremost actress of her time. One of her greatest successes was as Lady Betty Modish in Colley Cibber's *Careless Husband* (1704), and she created many parts in the genteel comedy of the period, though she long felt a reluctance to tragedy. Yet she created the rôle of Jane Shore (1714) and was a superb Cleopatra in Cibber's *Cæsar in Egypt* (1724), and her acting of Sophonisba (1730), her last new rôle, was said to have thrilled even the actors upon the stage. Her private life furnished occasion to the gossips, and she was the acknowledged mistress of Arthur Maynwaring and, after his death, of Gen. Charles Churchill. She was nevertheless on intimate terms with the great ladies of her day, and she was buried in Westminster Abbey. Consult the *Authentick Memoirs of the Life of that Celebrated Actress, Mrs. Ann Oldfield* (London, 1730); J. Geneste, *Some Account of the English Stage* (Bath, 1832); Baker, *English Actors from Shakespeare to Macready* (New York, 1879); Doran, *Annals of the Stage*, edited by Lowe (Bath, 1888).

OLD-FIELD LARK. A local name in the southern United States for the meadow lark (q.v.).

OLD FOLKS AT HOME. One of the most famous of Southern plantation songs (1850). First line: "'Way down upon the Suwanee Ribber." Both words and music are by Stephen Collins Foster.

OLD FORGE. A borough in Lackawanna Co., Pa., 4 miles southwest of Scranton, on the Lackawanna River and on the Delaware, Lackawanna, and Western Railroad (Map: Pennsylvania, K 3). It is in the anthracite region and is principally engaged in the mining and shipping of coal. There are also three silk mills. The high-school building is one of the finest in the county. The government is vested in a burgess, elected every three years, and a borough council. Settled in 1830, Old Forge was incorporated in 1899, having been organized from a part of Old Forge township. Pop., 1900, 5630; 1910, 11,324; 1914 (U. S. est.), 13,748.

OLD GRIMES. A poem and popular song by Albert G. Greene (1802–68), the name being taken from one of Crabbe's metrical tales.

OLD GUARD, The. The name borne by a select body of French troops during the First Empire. It was created by Napoleon I in 1804 out of the preëxisting Consular Guard and comprised picked men from every arm of the service. The Old Guard had its own general staff and received orders only from its own commander. Subsequently the name was usually restricted to a body of infantry consisting of three regiments of grenadiers and two regiments of chasseurs. The Old Guard played a leading part in the Napoleonic battles and suffered proportionately, its numbers after the Russian campaign being reduced to 500 men. In 1812 the Young Guard was created to act as a source of supply for the Old Guard. The latter, greatly increased in number, ended its career in glory in the last desperate charge at Waterloo.

OLD HAILEYBURY. See HAILEYBURY COLLEGE.

OLDHAM, ōld′am. A manufacturing town, municipal county, and parliamentary borough in Lancashire, England, on the Medlock, 7 miles northeast of Manchester (Map: England, D 3). The parish church and the town hall are the chief edifices. With its incorporation as a town in 1849 its municipal activity commenced. Its educational institutions include a lyceum, a Blue Coat school, a modern grammar school, and technical seminaries. It owns its gas and water (since 1853), electric-lighting plant, tramways, baths, washhouses, hospitals, cemeteries, markets, museum, public library, art gallery, and the Alexander Park of 60 acres. Modern destructors and installations dispose of refuse and sewage. Oldham owes its rapid increase in population and wealth to the extensive coal mines in the vicinity and to its cotton manufactures, which engage 300 mills with more than 12,000,000 spindles, and 35,000 employees. The damp air of the region gives the humidity necessary for the spinning of yarn. It is also celebrated for the manufacture of machinery for cotton spinning and wool weaving, gas meters, and sewing machines. In 1760 it was a village of 60 houses. Pop., 1801, 12,000; 1901, 137,246; 1911, 147,483.

OLDHAM, JOHN (c.1600–1636). An early settler in New England. He was born in England about 1600 and emigrated to Plymouth in 1623. In 1624 he and an Episcopalian minister named John Lyford conspired against the government of Plymouth and dispatched letters containing charges against the established authorities to England. The plot was detected and Oldham was banished from the Colony, although he later became reconciled with the inhabitants and rendered them some services. Settling in the Massachusetts Bay Colony, he became a man of prominence and was a deputy from Watertown to the first General Court of Magistrates and Representatives. In 1636, while he was on a trading expedition, his pinnace was treacherously captured near Block Island by Indians and he was killed. His murder was the immediate cause of the famous Pequot War. See PEQUOT.

OLDHAM, JOHN (1653–83). An English satirical poet, born at Shipton-Moyne, near Tetbury, in Gloucestershire. He graduated at St. Edmund Hall, Oxford, in 1674 and the next year became usher in a school at Croydon. Four years later he left Croydon to become tutor to the grandsons of a retired judge named Sir Edward Thurland, with whom he remained until 1681, when he became tutor to the son of Sir William Hickes. During his latter years he was aided by William Pierrepont, Earl of Kingston, at whose home he died. Oldham's poems, some of which possess real merit, had considerable influence on Pope and other English poets of the succeeding century. Among them are the satires *To a Friend about to Leave the University,* which he wrote while occupying his position at Croydon; *Satires upon the Jesuits* (1681), which reflect the panic-stricken condition of the people after the alleged discovery of the Popish Plot; and a *Satire against Virtue* (1681), which was taken so literally by the public that its author was compelled to explain in an *Apology* and a *Counterpart.* Though Oldham produced poems other than satirical, these and some adaptations of Horace and Juvenal are the works on which his reputation rests. A collective edition of his poetry appeared in 1683 under the title *Poems and Translations.* Consult Thompson, *The Compositions in Prose and Verse of Mr. John Oldham, to which are Added Memoirs of his Life* (3 vols., 1770).

OLDHAM, THOMAS (1816–78). An Irish geologist, born in Dublin, where he graduated from Trinity College in 1836. He then studied engineering at the University of Edinburgh and subsequently was identified prominently with the geological department of the Ordnance Survey of Ireland and with the Geological Survey of Ireland. (See OLDHAMIA.) At Trinity College Oldham became assistant professor of engineering in 1844 and professor of geology in 1845. Five years later, as superintendent, he organized the Geological Survey of India, in connection with which he founded various publications, and he wrote *On the Coal Resources of India* (1864). He retired from the Indian service in 1876.

OLDHAM, WILLIAM FITZJAMES (1854–). An American Methodist Episcopal ecclesiastic, born at Bangalore, India. He was educated at Allegheny College and Boston University, from which he graduated in 1883. In the same year he entered the ministry. He founded the Malaysia mission of the Methodist Episcopal church at Singapore, Straits Settlements, in 1884 and in 1885, also at Singapore, the Anglo-Chinese School, which came to have more than 1000 students. Subsequently he was professor of missions and comparative religion in Ohio Wesleyan University (1895–1900), assistant corresponding secretary of the Board of Foreign Missions (1900–04), and one of the missionary bishops of southern Asia (1904–12). After resigning the bishopric he was elected one of the three corresponding secretaries of the Board of Missions. In 1912 Dr. Oldham delivered the Graves lectures at Syracuse University. Besides contributions to the religious press his writings include *Malaysia; Nature's Wonderland* (1907).

OLDHA′MIA (Neo-Lat., named in honor of Thomas Oldham, q.v.). The oldest-known fossil alga, found in Cambrian rocks of Ireland. The type species, *Oldhamia antiqua* of Forbes, appears to be a coralline alga, while another species, *Oldhamia radiata,* is of uncertain affinity and may be a worm trail or even a series of minute wrinkles produced by distortion of the slate rocks upon which it is found. *Oldhamia* is of very doubtful occurrence in the Cambrian of America.

OLD HICKORY. An affectionate nickname of Andrew Jackson, given because of his strong and unbending characteristics.

OLD HUNDRED. A favorite hymn tune. By some the music is credited to Guillaume le Franc, a musician of Rouen, but is probably an adaptation of a popular tune of the fifteenth century. The melody was adapted to Beza's version of Psalm cxxxiv, included by him in the Geneva Psalter, the first copy of which, with his additional tunes, was printed in 1554. It was arranged by Louis Bourgeois, the musical editor of that book. The tune is found with different endings in the Flemish Psalter (Antwerp, 1540), in the Dutch Psalter (London, 1561), in the Psalms with music by Marot and Beza (Lyons, 1563), in Claude Goudimel's famous collection of tunes (Paris, 1565), and also in English and German tune books. In

England it was sung to Kethe's version of the hundredth Psalm, "All people that on earth do dwell," and called the Hundredth Tune. The word "old" was added in Brady and Tate's new version of the Psalter (London, 1596). Another name is "Savoy." Consult: W. H. Havergal, *History of the Old Hundredth Psalm Tune, with Specimens* (New York, 1854); Bovet, *Histoire du psautier des églises réformées* (Paris, 1872); S. J. A. Fitzgerald, *Stories of Famous Songs* (Philadelphia, 1901).

OLD IRONSIDES. The name popularly given to the United States frigate *Constitution* (q.v.).

OLD JEWRY. A street in London, near Mercer's Hall, deriving its name from the Jews, who were settled there before their persecution in 1291. On the site of their former synagogue stands Grocers' Hall.

OLD KENTUCKY HOME. A well-known plantation melody by Stephen Collins Foster (1850), beginning: "The sun shines bright in the old Kentucky home."

OLD LADY OF THREADNEEDLE STREET. See Threadneedle Street.

OLD LAW, The, or A New Way to Please You. A comedy by Middleton, Massinger, and Rowley, published in 1656.

OLD LIGHT ANTIBURGHERS. See Burgher and Antiburgher.

OLD LINE STATE. Maryland. See States, Popular Names of.

OLD MAN. An important mythological character in the lore of the Blackfoot (q.v.) Indians and neighboring tribes. He has the traits of the Coyote, an animal-like hero of the Shoshone and other western tribes, but always appears here as a human being. While he is in some respects a creator and transformer of the world, he is usually the perpetrator of mean, vulgar, but highly humorous deeds. Consult Wissler and Duvall, *The Mythology of the Blackfoot Indians* (New York, 1908).

OLD MAN OF THE MOUNTAIN. The name applied in mediæval times to the ruler of the Assassins (q.v.).

OLD MAN OF THE SEA. A monster in the form of an old man, described in the *Arabian Nights' Entertainments*.

OLD (WISLER) MENNONITES. See Mennonites, *The Old, or Wisler, Mennonites*.

OLDMIX'ON, John (1673–1742). An English historian, born at Axbridge in Somerset. During his early life he wrote a number of poems and plays, but in 1708 turned his attention to historical work and published *The British Empire in America*. For many years he was collector of the port at Bridgewater. His histories are now of little value, as they were written for party purposes. His attacks on Pope led the latter to give him a place in the *Dunciad*. The titles of some of his works are: *The Secret History of Europe* (1712–15); *The History of England during the Reigns of the Royal House of Stuart* (1729); *Memoirs of the Press, 1710–1740* (1742).

OLD MORTALITY. A novel by Sir Walter Scott (1816). The title is taken from the nickname of Robert Paterson, who for years kept in order the tombstones of the Covenanters.

OLD NORTH STATE. See North Carolina.

OLD OAKEN BUCKET, The. A very popular song by Samuel Woodworth, written in New York in 1817 and first published under the title of "The Bucket." The air is an adaptation by Frederick Smith of Kiallmark's music composed for Moore's "Araby's Daughter."

OLD PERSIAN. The ancient Iranian language of Persia. Its entire grammatical structure is closely akin to that found in the Avesta (q.v.). The inadequacy of the alphabet in which it is written (see Cuneiform Inscriptions) and the scantiness of the remnants of the language, however, prevent a complete knowledge of either its phonology or morphology. Its principal phonological characteristics are as follows: Indo-Ger. *r̥* is represented by *ar*, as Skt. *kṛta*, deed, OPers. *karta;* Indo-Ger. nasalized vowels lose their nasalization, at least in the script, as Skt. *aśaṁsam*, I said, OPers. *aθaham;* epenthetic *u* is developed between *d* and *r* and between *g* and *d*, as Skt. *adruhyat*, he deceived, OPers. *adūrūjiya*, Av. *Suγδa*, Sogdiana, OPers. *Sugūda*, *Suguda;* Indo-Ger. *tr* becomes θ^{r}, as Skt. *putra*, son, OPers. $pu\theta^{r}a$; Indo-Ger. *i*, *u*, are written *iy*, *uv* after consonants, as Skt. *yadi*, if, OPers. *yadiy*, Skt. *dadātu*, let him give, OPers. *dadātuv;* Indo-Ger. *ti* becomes *š*, as Skt. *mr̥tyu*, man, OPers. *maršiya;* Indo-Ger. final *t* and *d* are lost in Old Persian, as Skt. *abharat*, he bore, OPers. *abara*, but Av. *barat;* Indo-Ger. *s* is lost, at least in the script, before *u*, *r*, and *m*, as Skt. *svaśva*, rich in horses, OPers. *uvaspa*, Skt. *asmi*, I am, OPers. *amiy*, Skt. *srōtas*, river, OPers. *rauta;* Iranian *s* and *z* become *θ* and *d* before vowels and *r*, as Av. *sarəδa*, sort, OPers. *θarda*, Av. *nisrinaomi*, I restore, OPers. $niya\theta^{r}\bar{a}rayam$, I restored. The inflection, so far as it can be reconstructed, does not differ essentially from that of the Avesta, except that the imperfect tense of the Old Persian verb invariably has the augment, which is usually lacking in Avestan, as OPers. *adadā*, he gave, Av. *daθāt*. The attempt which has been made by certain scholars to prove the existence of various dialects in the extant Old Persian texts can scarcely be regarded as successful.

The Old Persian records, apart from glosses and proper names on seals, vases, and the like, consist of a number of cuneiform inscriptions carved by the Achæmenian kings Cyrus, Darius I, Xerxes I, Artaxerxes I, Artaxerxes Mnemon, and Artaxerxes Ochus. These inscriptions are chiefly at Behistun, Persepolis, Naksh-i-Rustam, Alvand, Van, Susa, and Suez. Of them by far the most important are the five tablets, amounting to 414 lines, and a few minor texts, carved by order of Darius I on the mountain side at Behistun (q.v.). Here the King relates his history in a dignified tone, which in the fourth tablet rises to some degree of literary merit. Next in importance is the inscription of Darius at Naksh-i-Rustam (see Persepolis) in 60 lines, conspicuous for its stylistic merit, and two briefer texts, of 24 lines each, of the same King at Persepolis. The texts of Xerxes and of the three Artaxerxeses are little more than replicas of the minor tablets of Darius. In the latest inscriptions, especially in the single one of Artaxerxes Mnemon, set up by him at Susa, a decay in grammar seems evident. The style of the Old Persian inscriptions, which shows marked traces of literary influence from the Assyro-Babylonian tablets, is simple narrative, and in general the meaning of the words is tolerably certain. There are, however, a number of difficult passages, where the Babylonian and the Elamitic (sometimes called New Susian) versions carved side by side with the Persian inscription of Behistun give no help. This Babylonian translation is, unfortunately, very fragmentary, while the Elamitic, interpreted only by identifying words in it which correspond to known Old Persian terms, is not always a safe guide in doubtful passages. There are a number of gaps in the Old Persian inscriptions, and the reading of several words is not yet determined. It is possible that there are other Old Persian inscriptions which have not yet been discovered, and which, if found, would help towards solving at least some of the problems that now beset the interpretation of these texts. Herodotus, e.g. (Hist., iii, 88; iii, 91), refers to two short inscriptions by Darius, and there is a remote possibility that the pillar containing one of them may some day be found in Thrace.

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OLD POINT COMFORT. A frequented watering place in Elizabeth City Co., Va., 12 miles north of Norfolk, on the Chesapeake and Ohio and the New York, Philadelphia, and Norfolk railroads (Map: Virginia, H 5). Its location on a small peninsula, where Hampton Roads and Chesapeake Bay join the Atlantic Ocean, is one of great natural beauty. A fine beach for bathing and good boating and fishing, together with the activities of garrison life at Fort Monroe (q.v.), situated here, are prominent attractions. The climate is remarkably mild and equable. There are two large hotels, and the resort is frequented in both summer and winter. A considerable quantity of fish and oysters and vegetables is shipped from here.

OLD PRUSSIAN LANGUAGE. An extinct member of the Baltic group of Indo-Germanic languages which was spoken until the seventeenth century in Prussia, along the Baltic coast between the Vistula and the Niemen. The three languages comprising this group (Old Prussian, Lithuanian, and Lettic) form a special division of the larger Slavo-Lettic branch. The remnants of the Old Prussian language are very scanty and are too meagre to permit a reconstruction of the grammar. The Old Prussian fragments consist of translations of two catechisms, printed in 1545, and of the Short Catechism of Luther (1561). There are also two Old Prussian-German vocabularies, that of Elbing, compiled in the first half of the fifteenth century, containing 802 words, some of which, however, are loan words, and that of Grunau, who composed a list of 100 words between 1517 and 1526. This vocabulary of Grunau is so inaccurate as to be of little value. The Elbing list, on the contrary, if used with caution, is the most valuable source of our knowledge of the language next to Luther's catechism. The chief phonological characteristics of Old Prussian are as follows: Indo-Ger. *ē* remains *ē* in Old Prussian under the circumflex accent, but becomes *ī* under the acute, as *semmē*, earth, accented on the ultimate like the equivalent Russian *zemlyá*, but with the circumflex like Lithuanian *duktè*, daughter; *turrīt*, to do, Lith. *turéti*. Indo-Ger. *o* becomes *a* in Old Prussian as in the other Baltic dialects (Lettic and Lithuanian), as Lat. *oculus*, OChurch Slav. *oko*, eye, but OPruss. *ackis*, Lith. *ãkys*, Lettic *azs*, while *ō*, like *ā*, is represented by *ā* or, after gutturals, by *ū* in Old Prussian, *o* (*ů*) in Lithuanian, and *ā* (*ů*) in Lettic, as Goth. *frōþs*, wise, OPruss. *prātin*, counsel, Lith. *prōtas*, understanding, Lettic *prāts*, will, but OLat. *hemōn*, man, OPruss. *smūni*. Indo-Ger. *r̥*, *l̥*, *m̥*, *n̥* become in Old Prussian as in the other Baltic dialects *ir*, *il*, *im*, *in*, as Skt. *vr̥thā*, in vain, OPruss. *prawilts*, to betray, Lith. *vilstu*, Lettic *wilt*, to deceive. In script at least there is no distinction between *s* and *z*, as Skt. *daśa*, Lat. *decem*, OPruss. *dessimtons*, Lith. *dēszimtis*, ten, OChurch Slav. *desętĭ*, but Skt. *jñā*, Gk. γιγνώσκειν, OPruss. *posinnāt*, Lith. *zinóti*, Lettic *ʒināt*, OChurch Slav. *znati*, to know. In accent Old Prussian seems to have resembled Lettic rather than Lithuanian. The Old Prussian long diphthongs, long vowel plus liquid, and nasal plus consonant, therefore, correspond, like the Lettic acute accent, to the Lithuanian circumflex, while like combinations with unlengthened vowel correspond, like the Lettic lengthened vowel, to the Lithuanian acute. The noun had five cases, nominative, accusative, genitive, dative, and vocative, as well as a few traces of an instrumental. The original Indo-Germanic terminations are, in general, well preserved, as dat. sing. *wirdai*, to the word, Lith. *va͂rdui*, cf. Av. *vəhrkāi*, Gk. λύκῳ to the wolf; acc. pl. *wirdans*, words, cf. Cretan Gk. λύκους, Goth. *wulfans*, wolves; gen. pl., as *grīkan*, of sins, Lith. *grẽkũ*, Lettic *griku*, cf. Vedic Skt. *vr̥kām*, of wolves, Gk. λύκων, Lat. *deum*, of gods. On the other hand, the genitive singular of *s* stems is borrowed from those in *-ā-*, as *Deiwas*, of God (cf. *gennas*, of a woman, Gk. χώρας, of a country), but Lith. *vilko*, of a wolf, Lettic *vilka*, OChurch Slav. *vlŭko*, and the dative plural receives an *s* from the accusative plural, as *auschautenīkamans*, to debtors, but Lith. *rañkomus*, *rañkoms*, to hands, Lettic *rōkeem*, OChurch Slav. *rąkomŭ*. The verb has a present and past indicative, an imperative (optative), an optative of secondary formation, present and past active and passive participles, and an infinitive. The third person plural, as in the other Baltic dialects, coincides in form with the singular. The ending is *a*, as *senrīnka*, he gathers, Lith. *reñka*, and is a relic of the Indo-Germanic present injunctive, as Skt. *cōdayat*, he is to rouse. The first person singular is also old, as *imma*, I take, Gk. λύω, I loose. The infinitive appears in three forms, undifferentiated in meaning, as *dātwei*, *dāton*, *dāt*, to give. The form *dātwei* is usually compared with such Vedic Sanskrit infinitives as *dhātavē*, to place, while *dāton*, like Lith. *detũ*, and OChurch Slav. *dētŭ* is to be compared with Skt. *dhātum*, Lat. *con-ditum*, to place. The explanation of such infinitives as *dāt* is not yet clear. Consult: G. H. F. Nesselmann, *Die Sprache der alten Preussen* (Berlin, 1845); id., *Thesaurus Linguæ Prussicæ* (ib., 1873); Erich Berneker, *Die preussische Sprache* (Strassburg, 1896); Martin Schultze, *Grammatik der altpreussischen Sprache* (Leipzig, 1897); Trautmann, *Altpreussischen Sprachdenkmäler* (Göttingen, 1910).

OLD RED SANDSTONE. The name given to a large series of Paleozoic rocks, of which red sandstones are the most conspicuous portions, but which contain also white, yellow, or green sandstones, as well as beds of clay and limestone. The group lies below the Carboniferous strata, and was called Old to distinguish it from a newer series of similar beds which occur above the coal measures. The discovery that the highly fossiliferous calcareous rocks of Devonshire and the Continent occupied the same geological horizon showed that the name was very far from being descriptive of all the deposits of the period and suggested to Murchison and Sedgwick the desirability of giving them a new designation. They consequently proposed Devonian, which has been extensively adopted. The name has been rendered classical by Hugh Miller in his books, *The Old Red Sandstone* and *Footprints of the Creator*. The formation which has been laid down in inland seas is noted for its abundant fish remains.

OLD ROWLEY. A popular name of Charles II. The name is derived from Rowley, a favorite horse of the monarch.

OLD SARUM. See Sarum, Old.

OLD SCHOOL, Oliver. See Dennie, Joseph.

OLD SCHOOL (or Primitive) **BAPTISTS.** See Baptists.

OLD SLOVENIAN. See Old Church Slavic Language and Literature.

OLD SQUAW, or Old Wife. A sea duck (*Clangula*, or *Harelda, hyemalis*) of all northern regions, easily recognized by its much elongated tail feathers; the long-tailed duck. See Duck, and Plate of Ducks, Wild.

OLDSTYLE′, Jonathan. A pseudonym of Washington Irving (q.v.).

OLD TOWN. A city in Penobscot Co., Me., 13 miles by rail north-northeast of Bangor, on the Penobscot River and on the Maine Central and the Bangor and Aroostook railroads (Map: Maine, D 4). It has a Carnegie library, and among the prominent buildings are the city hall, high school, post office, Commercial Club, and Masonic Building. The lumber interests of the city are very important, and there are also manufactories of wood pulp, box board, bateaux and canoes, woolens, patent medicines, chemical fibre, and machinery and foundry products. Good water power is available. Under a revised charter of 1895 the government is administered by a mayor, annually elected, and a unicameral council. Settled about 1820, Old Town was set off from Orono and incorporated as a town in 1840, and in 1891 was chartered as a city. Pop., 1900, 5763; 1910, 6317.

OLD UNCLE NED. One of Stephen Collins Foster's popular negro songs (1847), beginning "There was an old darky and his name was Uncle Ned."

OLDWIFE. See Spot.

OLD WIVES' TALE, The. A farce or interlude by George Peele, printed in 1595, but acted probably in 1590. The plot of this lively farce is taken from Ariosto, but its chief interest is the fact that it suggested to Milton the plan of *Comus*. The troupe who act part of the *Tale* are transformed into the Lady, the Brothers, and Spirit of the poem.

The same title is used by Arnold Bennett for one of his novels.

OLD WOMAN'S SUMMER. See Indian Summer.

OLDYS, ōl′dĭs, William (1696–1761). An English antiquary, natural son of Dr. William Oldys, Chancellor of Lincoln, and born probably in London. He inherited some property from his father, but lost heavily through connection with the South Sea Bubble in 1720. For several years he aided Dr. Knowles in editing the *Earl of Strafforde's Letters and Despatches* (2 vols., 1739). During this time, also, he collected a valuable library, which he sold in 1731 to the Earl of Oxford, whose literary secretary he became in 1738. After Oxford's death, in 1741, Oldys's life became one of drudgery and hardship. From 1744 to 1746 he collaborated with Dr. Johnson on the *Harleian Miscellany*. In 1751–53 he was imprisoned in the Fleet for debt. From 1755 until shortly before his death he was Norroy king-at-arms. His works, which have been often used by later writers, show deep learning and thorough research. Among the best known is the *Life of Raleigh*, originally prefixed to the *History of the World* (2 vols., 1736) and later to the collected edition of Sir Walter's *Works* (8 vols., Oxford, 1829). Another valuable work is his *British Librarian* (1737), a critical catalogue. Consult Yeowell, *A Literary Antiquary* (London, 1862).

OLEAN, ō′lē-ăn′. A city in Cattaraugus Co., N. Y., 71 miles by rail south by east of Buffalo, at the confluence of the Allegheny River with Olean Creek, and on the Erie, the Pennsylvania, and the Pittsburgh, Shawmut and Northern railroads (Map: New York, B 6). It has a public library, Higgins Memorial Hospital, a State armory, a fine high-school building, and several city parks. The driving park here has been the scene of famous races; and in the vicinity is the well-known Rock City, a collection of massive conglomerate rocks. St. Bonaventure College and St. Elizabeth Convent are 2 miles west of the city. Olean is noted for its extensive oil interests. Owing to the proximity of the Pennsylvania oil fields it is a storage place for large quantities of petroleum and is the terminus of several pipe lines. Leather interests also are prominent. The industrial establishments include oil refineries, tanneries, planing mills, carriage and wagon works, railroad shops, marble works, foundries, glass factories, brickyards, flouring mills, breweries, machine shops, a silk mill, a cutlery plant, etc. Settled in 1804, Olean was chartered as a city in 1893, the charter of that date being now in operation and providing for a government vested in a mayor, elected biennially, and a unicameral council. The water works are owned and operated by the municipality. Pop., 1900, 9462; 1910, 14,743; 1915 (State census), 17,981.

O'LEAN'DER (Fr. *oléandre*, Sp. *oleandro*, *eloendro*, ML. *arodandrum*, corrupted by popular etymology with Lat. *olea*, olive tree, from Lat. *rhododendron*, Gk. *ῥοδόδενδρον*, oleander, from *ῥόδον*, *rhodon*, rose, + *δένδρον*, dendron, tree), *Nerium*. A genus of plants of the family Apocynaceæ. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The common oleander (*Nerium oleander*), a native of the Mediterranean region and many of the warmer temperate parts of Asia, is frequently planted in many countries as an ornamental shrub, and is very common in northern latitudes as a house plant. It has beautiful red or sometimes white flowers. The English call it rose bay and the French rose laurel (*laurier rose*). It attains a height of 8 to 10 feet. Its flowers give a splendid appearance to many ruins in the south of Italy. It delights in moist situations and is often found near streams. The propagation of the plant is readily effected by layers and cuttings. The cuttings are taken from leading shoots, potted singly and placed in a warm frame. A very common practice is to start the roots of the cuttings in bottles of water and to pot them afterward. The plant is reputed to be poisonous.

OLEANDER.

OLEARIUS, ŏ'lā-ā'rē-ụs, Adam, Latinized form of Oelschläger (c.1603–71). A German author, who introduced Persian poetry into the literature of the seventeenth century. He was born at Aschersleben and studied at Leipzig. In 1633, with Paul Fleming (q.v.), he went to Persia for Frederick III of Holstein-Gottorp. His studies made him the greatest European Persian scholar of his time. In 1651 he became a member of an association for the advancement of the German language, the Fruchtbringende Gesellschaft. He had an excellent prose style. His fame rests on his *Beschreibung der neuen orientalischen Reise* (1647; also in French, Dutch, and English, 1666), a work valuable alike as a literary production and as a source of scientific knowledge. Olearius also published a version of Saadi's *Gulistan*, under the title *Persianisches Rosenthal* (1654, 1660). Consult Grosse, *Adam Olearius* (Aschersleben, 1867), and the *Allgemeine deutsche Biographie*, vol. xxiv (Leipzig, 1887).

OLE'AROS. The ancient name of Antiparos (q.v.), one of the Cyclades.

O'LEAS'TER. A shrub. See Elæagnus.

OLEATES, ŏ'lē-āts. See Oleic Acid.

OLE BULL. See Bull, Ole Bornemann.

OLE'FIANT GAS. See Ethylene.

OLEFINS, ŏ'lē-fĭnz. See Hydrocarbons.

OLEIC (ō-lē'ĭk) **ACID** (from Lat. *oleum*, oil), $C_{18}H_{34}O_2$. A colorless liquid of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colors. At low temperature it solidifies to a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. The melting point of the pure acid is 14° C. (57° F.). It is not a volatile acid, and on the application of a strong heat, under ordinary atmospheric pressure, it breaks up into several substances; it may, however, be distilled under reduced pressures, or in a current of superheated steam, when it passes over undecomposed. If oleic acid be exposed to the action of nitrous acid, it is converted into another acid, termed elaidic acid. The latter is a crystalline substance melting at about 46° C. (115° F.) and having the same molecular composition as oleic acid. A very small quantity of nitrous acid is sufficient to effect this remarkable change, the nature of which is unknown. When heated with caustic potash oleic acid breaks up into palmitic and acetic acids, as shown by the equation:

$$\underset{\text{Oleic acid}}{C_{18}H_{34}O_2} + \underset{\substack{\text{Caustic}\\\text{potash}}}{2KOH} = \underset{\substack{\text{Palmitate of}\\\text{potassium}}}{C_{16}H_{31}O_2K} + \underset{\substack{\text{Acetate of}\\\text{potassium}}}{C_2H_3O_2K} + \underset{\substack{\text{Hydro-}\\\text{gen}}}{H_2}$$

Oleic acid is a component of olein (q.v.), which exists in most of the fats and fatty oils of the animal and vegetable kingdoms and most abundantly in the liquid fats or oils, whence its name. It may be readily prepared in a pure state from fats rich in olein. For this purpose the fat employed is saponified by heating with a solution of caustic potash and the soap thus obtained is decomposed with hydrochloric acid, which sets free the acids originally contained in the fat. The mixture of acids is then treated with lead oxide at 100° C. (212° F.), and by means of ether the oleate of lead is dissolved out of the mixture of lead salts obtained. On filtering and distilling off the ether the oleate of lead is decomposed with hydrochloric acid, and the oleic acid is purified by cooling to about 6° or 7° below zero centigrade (about 20° F.) and removing the impurities, which remain liquid, by pressure and washing with small quantities of alcohol.

With reference to the chemical constitution of oleic acid, it is known to contain a normal chain of 18 carbon atoms and 1 double bond; but which two of the carbon atoms are linked to each other by that double bond has not yet been exactly ascertained. By the action of nascent hydrogen oleic acid is readily converted into stearic acid (q.v.).

Of the oleates, or salts of oleic acid, the most important are the alkali salts, which are among the constituents of soap; they are soluble in water and in alcohol, and are precipitated from their aqueous solution by common salt. The lead salt, used as lead plaster (diachylon plaster), may be obtained by adding lead acetate to an aqueous solution of sodium oleate; its formula is $(C_{18}H_{33}O_2)_2Pb$; it melts at 80° C. (176° F.).

OLEIN, ō′lē-ĭn (from Lat. *oleum*, oil), or TRIOLEIN, $C_3H_5(C_{18}H_{33}O_2)_3$. The glyceride of oleic acid. Pure olein is a colorless and inodorous oil, insoluble in water and only slightly soluble in cold alcohol, but dissolves in ether in all proportions. By exposure to the air it darkens in color, becomes acid and rancid, and finally assumes a resinoid appearance. Nitrous acid converts it into an isomeric white solid fat named elaidin, the glyceride of elaidic acid. (See OLEIC ACID.) Pure olein is obtained by cooling olive oil to 0° C. (32° F.), which occasions the separation of the stearin and palmitin in a solid form. The fluid portion is then dissolved in alcohol, which on being cooled to 0° C. (32° F.) deposits in a solid form everything but olein, which is obtained in a pure state by driving off by heat the alcohol from the decanted or filtered solution. By the action of hydrogen gas under pressure and in the presence of finely divided metallic nickel, olein becomes transformed into a solid fat—a process which is now used on an industrial scale.

Olein is one of the three constituents common to all fats, the other constituents being palmitin and stearin. It forms the predominating constituent of liquid fats, such as olive oil and oil of almonds. See FATS; GLYCERIN; OIL; OLEIC ACID.

OL′ENEL′LUS (Neo-Lat., dim. of *olenus*). An important genus of trilobites characteristic of the Lower Cambrian series, for which reason these beds are termed the Olenellus zone. The animal had a flat, tapering body covered by a hard shell like that of a crab, made up of 14 loosely jointed segments, a broad head with large kidney-shaped eyes and long slender cheek spines, and there was a long slender spine at the end of the tail or pygidium. See TRILOBITA.

O′LENUS (Neo-Lat., from Lat. *Olenos*, Gk. *Ὤλενος*, name of a man changed to stone). A trilobite from the Upper Cambrian and Lower Ordovician formations of Europe. See TRILOBITA.

O′LEOGRAPH (from Lat. *oleum*, oil + Gk. *γράφειν*, *graphein*, to write). A chromolithograph which has been roughed on a lithographic stone engraved so as to imitate canvas. The resemblance to oil painting is further increased by mounting the oleograph on canvas, sizing, and varnishing. The colors used in printing oleographs are a little darker than in the case of chromolithographs, which imitate water-color paintings.

OLEOMARGARINE, ō′lē-ō-mär′gȧ-rĭn (from Lat. *oleum*, oil, Eng. *margarine*, from Lat. *margarita*, from Gk. *μαργαρίτης*, *margaritēs*, pearl, from *μάργαρος*, *margaros*, pearl oyster), ARTIFICIAL BUTTER, or BUTTERINE. An artificial or manufactured substitute for dairy butter, made from oleo oil and other fatty substances worked together and churned with milk, coloring matter being added in some grades. The material originated in France, as the result of a prize offered at the instance of Napoleon III for the best substitute for butter. This was awarded in 1869 to Hippolyte Mège, whose process, considerably modified, is still employed in the manufacture of oleomargarine. In preparing oleo oil, the fat that is removed from beef animals at the time of slaughtering is thoroughly washed in warm water and chilled and hardened by means of ice water. It is then finely cut up by machinery and melted in steam-jacketed caldrons at about 160° F. (71° C.), after which it is allowed to settle. Salt is scattered over the surface of the fat, which accelerates the settling of the fibre or membrane. After the first settling the clear oil is siphoned to a second series of jacketed caldrons, where more salt is added and the temperature controlled until the second settling is completed, when it is siphoned into vats, in which it is allowed to stand from three to five days at a temperature favorable to the crystallization of the stearin. The mass is then thoroughly mixed, wrapped in cloths, and submitted to powerful pressure, which separates the oleo oil from the stearin. Several grades of oleo oil are made, the quality depending upon the grade of animals and the part of the body from which the fat is obtained. Neutral lard, or neutral, another important constituent of oleomargarine, is prepared from the leaf and the back fat of the hog, the best grade coming from the leaf. Cottonseed oil enters quite largely into the composition of oleomargarine, especially of the cheaper grades. These fats are mixed in various proportions by different manufacturers, each having his own working formula. So much depends on the handling of the oils and the regulation of the temperature at each successive stage that different manufacturers using the same grade of oils in similar combinations will secure quite different results. The oleo oil and the neutral lard are each melted in separate tanks, and are piped into a mixing tank mounted on scales, so that the exact proportions called for by the formula may be used. If cottonseed oil is used it is added at this stage. The mixed fats are piped to the churn, where the melted butter, cream or milk, and the coloring matter are added. Milk is used much more commonly than butter or cream, and this is ripened or fermented, with a special culture of bacteria to give a pronounced lactic-acid flavor resembling that of butter. The mixture is then churned, and the liquid oleomargarine is drawn into a vat of ice water, which chills and hardens it before it can crystallize; after which it is softened by standing in the tempering room, worked in a machine butter worker, salted, and put up in tubs or rolls.

There are various grades of oleomargarine, according to the grades and proportions of the materials used. The cheapest grades are made from low-grade oils obtained from scrap fat and made firm by the addition of stearin or similar substance, so that a greater proportion of cottonseed oil can be employed. Such grades are churned with skim milk or buttermilk, and glycerin is sometimes added to improve the appearance of the product. The highest grades are made from pure oleo oil and neutral lard of the best quality, with little or no cottonseed oil, and are churned with whole milk, cream, or creamery butter.

Butterine is a commercial name for oleomargarine, which was originally used to indicate a product of a higher grade or containing a considerable proportion of butter. The term now has no special significance in trade, and is not used in the oleomargarine laws, although still employed by some dealers for obvious reasons.

When made from good stock oleomargarine is a cleanly, wholesome, and nutritious article of food. Numerous experiments have shown it to possess a food value practically equal to that of butter, and it has the advantage of keeping better and longer than butter, as it does not tend to become rancid. It has not the delicate flavor of the best butter, but with most people the objection to it is founded on sentiment and on its fraudulent sale. Stringent laws have been made to regulate its manufacture and sale, requiring it to be labeled and taxing it heavily when colored in imitation of butter. The object of these laws has, however, been very largely defeated by the ingenuity of manufacturers, and oleomargarine is now placed on the market which apparently contains no artificial coloring matter and yet imitates the color of butter very closely.

The production of oleomargarine in the United States increased enormously from 1890 to 1900, but decreased then owing to the imposition of a Federal tax of one-fourth cent a pound on uncolored and of 10 cents on colored oleomargarine and the enforcement of stringent food laws. The value of the product in 1909 is given by the United States Census at about $14,000,000. The exports of oleomargarine from the United States in the fiscal year 1914 amounted to 2,533,000 pounds, valued at $263,453; and of oleo oil, 97,017,000 pounds, valued at $10,157,000. The oleomargarine went largely to the West Indies; the oleo oil, for use in manufacture of oleomargarine, was taken by Holland (over 50 per cent), Germany, Norway, Sweden, Denmark, the United Kingdom, and Belgium. Consult: New York State Legislature, Committee on Public Health, *Investigation of Adulterated Products* (Albany, 1884); United States Department of Agriculture, *Yearbook, 1895* (Washington, 1896); United States Office of Internal Revenue, *Revised Regulations Concerning Oleomargarine* (ib., 1907); also United States Census, *Bulletin No. 138* (ib., 1902), on oleomargarine.

O′LEOM′ETER (from Lat. *oleum*, oil + Gk. *μέτρον*, *metron*, measure), or Elaïometer. An areometer used for ascertaining the densities of fixed oils.

OLEO OIL. See Oleomargarine.

OLÉRON, ō′lā′rôɴ′. An island opposite the mouth of the river Charente, on the west coast of France. It forms a portion of the Department of Charente Inférieure (Map: France, N., D 7). The island is 19 miles long and has an area of 65 square miles. It is low and the shore line is largely covered with sand dunes and salt lagoons, but the interior is well cultivated, producing grain, wine, vegetables, and grapes. Salt is one of the chief products of the island, and shipbuilding is carried on at the harbor of Le Château, which has steamship communication with Rochefort and other coast towns. There are also fisheries and extensive oyster beds. Pop., 1901, 17,033. Chief town, St. Pierre. Pop., 1911 (commune), 4306.

OLÉRON, Laws of, etc. A mediæval code of maritime laws promulgated and published some time during the twelfth century by Eleanor, Duchess of Guienne (Aquitaine). These laws consisted of a collection of the judgments of the maritime court of Oléron, together with a compilation of the customs and usages of the sea having the force of law among the mariners of that island, which was an important shipping centre. Some years after this codification was made and published in Oléron, Richard I, son of Eleanor, introduced the whole body of these laws into England. They were one of the main sources of the maritime laws of Wisby, and were published in and had an important influence on the maritime laws of all the countries of Europe. The modern English and American maritime law has been developed from these laws as a basis, influenced by the Rhodian maritime laws, the laws of Wisby, the civil law, and the customs and usages of those engaged in shipping. See Admiralty Law; Maritime Law; Rhodes, Law of; Wisby, Laws of. Consult Sir Travers Twiss, *Monumenta Juridica: The Black Book of the Admiralty* (London, 1871), and the authorities referred to under Admiralty Law.

OLEVIANUS, ō′lā-vē-ä′nụs, Kaspar (1536–87). A German Church reformer. He was born in Treves and studied law in Paris, Orléans, and Bourges. He became an ardent follower of Calvin and studied theology at Geneva. The Archbishop of Treves had him imprisoned for explaining in popular lectures the principles of the Reformation. On the payment of a large sum he was released, but was expelled from the town with his followers. At the invitation of the Elector Frederick III Olevianus became teacher and in 1561 professor of theology in Heidelberg, where, with Ursinus, he remodeled the Church of the electorate by the principles of Calvin and worked out the Heidelberg Confession. Banished upon the accession of Louis VI, Olevianus went to Berleburg (1576) and Herborn (1584). He was successful in introducing the Reformed church in Nassau-Siegen, Solms, Wied, and elsewhere. Consult F. M. Cuno, *Blätter der Erinnerung an Dr. Caspar Olevianus* (Barmen, 1887).

OLFAC′TORY SENSE. See Chemical Sense in Animals; Nose; Smell.

OL′GA, Saint (?–969). A saint of the Russian church. She was the wife of Prince Igor of Kiev, who was slain when returning from an unsuccessful expedition to Constantinople (945). His widow avenged his death, assumed the government in his stead, and governed until her son Sviatoslav came of age (955). Later, at Constantinople, she was received into the Church, assuming at baptism the name of Helena. Returning to Russia, she labored zealously to propagate her new faith. She is held in high veneration in the Russian church. Her festival is on July 11. Consult D'Elissalde Castremont, *Histoire de l'introduction du christianisme sur le continent russe, et la vie de Sainte Olga* (Paris, 1879).

OLIB′ANUM, or Frankincense (ML. *olibanum*, probably from Ar. *al lubān*, the incense, from *al*, the + *lubān*, incense, connected with Heb. *lebōnā*, incense, from *lāban*, to be white, Aram. *lebūnetā*, Syriac *lebontā*, Phœnician *lebōnat*, incense, whence Gk. *λίβανος*, *libanos*, Lat. *libanus*, frankincense). A gum resin that flows from incisions made in certain species of *Boswellia* (q.v.) growing in northeastern Africa and on the southeastern coast of Arabia. It occurs in commerce in semitransparent yellowish tears and masses, has a bitter nauseous taste, is hard, brittle, and capable of being pulverized, and diffuses a strong aromatic odor when burned. The chief constituents of olibanum are resin, gum, and volatile oil. A rough or approximate separation may be effected by distilling the oil and dissolving the resin in alcohol and the gum in water. Olibanum was formerly used in medicine, chiefly to restrain excessive mucous discharges, but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is still employed for fumigation and is used as incense in Roman and Greek Catholic churches. Large quantities of it are used in China.

OLIER, ô′lyâ′, JEAN JACQUES (1608–57). A French priest, founder and first head of the famous Seminary of St. Sulpice in Paris and of the congregation of that name. (See SULPICIANS.) He was born in Paris, studied in Lyons and at the Sorbonne, and then entered into close relations with St. Vincent de Paul. Ordained priest in 1633, he later declined the bishopric of Châlons-sur-Marne, offered him by Richelieu. In 1642 he collected a few clerics about him at Vaugirard, near Paris, and a few months later transferred his small community to St. Sulpice, a disreputable parish in the Faubourg Saint-Germain. Olier instituted all manner of reforms, and by the aid of zealous colleagues transformed the neighborhood. Having built a new church, he established his seminary in connection with it. In 1652, for reasons of health, he resigned his parochial charge and devoted himself altogether for the next five years to the upbuilding of the seminary. He also founded seminaries at Montreal and several other places, also schools and institutions for the care of the poor and infirm. He died April 2, 1657. An excellent *Life* is that of Faillon (3 vols., Paris, 1873); a very good English one, based upon it, is by Healy Thompson (London, 1885). Consult also lives by De Fruges (Paris, 1906) and Letourneau (ib., 1905, 1906).

OLIGARCHY, ŏl′ĭ-gär′kĭ (Gk. *ὀλιγαρχία*, *oligarchia*, from *ὀλίγοι*, *oligoi*, few + *ἄρχειν*, *archein*, to rule). A form of government in which the supreme power is vested in a small class of persons. (See ARISTOCRACY.) It is a term applied by Greek political writers to that perversion of an aristocracy in which the rule of the dominant part of the community ceases to be the exponent of the general interests of the state, owing to the cessation of those substantial grounds of preëminence in which an aristocracy originated. The governing power in these circumstances becomes a faction, whose efforts are chiefly devoted to their own aggrandizement and the extension of their power and privileges.

OL′IGOCENE EPOCH (from Gk. *ὀλίγος*, *oligos*, few, little + *καινός*, *kainos*, new). A subdivision of the Tertiary period, preceding the Miocene epoch. The term has not been generally used in the United States for the reason that rocks of this age attain only limited development here, although important in Europe, where the Oligocene has coördinate rank with the Eocene and other divisions of the Tertiary system. The White River formation of Colorado comprising fresh-water strata is referred to this epoch, and there are smaller areas of contemporaneous beds in North Dakota and in the Northwest Territory of Canada. Some of the Tertiary beds of the Atlantic and Gulf coasts are probably of Oligocene age. Oligocene strata cover wide areas in central and southern Europe. Fossils are abundant in the rocks of this age both in America and Europe. Especially interesting are the well-preserved insect remains in the Florissant beds of Colorado and of the amber deposits of the Baltic region. Vertebrates are found in great numbers and wide variety, the horse family being represented by the three-toed *Mesohippus*. See TERTIARY SYSTEM.

OLIGOCHÆTA, ŏl′ĭ-gô-kē′tȧ (Neo-Lat., from Gk. *ὀλίγος*, *oligos*, few, little + *χαίτη*, *chaitē*, *mane*). A suborder of chætopod annelids, of which the common earthworm (q.v.) is a good example. The head is not well marked, and there are no tentacles or eyes. The locomotive appendages are in the form of simple bristles attached in rows to the sides and ventral surface of the body, and there are no branchiæ or parapodia. All are hermaphrodite, and the young pass through no metamorphosis. The species are mostly fresh-water or terrestrial.

OL′IGOCLASE (from Gk. *ὀλίγος*, *oligos*, few, little + *κλάσις*, *klasis*, fracture). A sodium-calcium-aluminium silicate belonging in the feldspar group of minerals and intermediate between albite and anorthite. It crystallizes in forms of the triclinic system, which are, however, very close in angles to those of the monoclinic feldspar orthoclase (q.v.). Its color is generally white, though sometimes shaded with gray, green, or red tints, and it has a vitreous lustre. It occurs in the older rocks, such as granite, and also in various eruptive rocks, such as andesite; it is found in Sweden, Finland, Germany, Switzerland, and in the United States at various localities in New Hampshire, Connecticut, New York, Pennsylvania, and North Carolina. Certain varieties of this mineral, especially those of a reddish color, show internal firelike reflections that are due to finely disseminated crystals of iron oxide and, when polished, form the gems known as sun stones.

O′LIN, STEPHEN (1797–1851). An American Methodist Episcopal clergyman and educator, born at Leicester, Vt. He graduated from Middlebury College in 1820 with highest honors and in 1824 entered the ministry, joining the South Carolina conference of his denomination. He was principal of the Tabernacle Academy in South Carolina (1820–24), professor of belles lettres in the University of Georgia (1826–32), and president of Randolph Macon College, Virginia (1832–37). His health failing, he resigned and traveled abroad until 1841. From 1842 until his death he was president of Wesleyan University, Connecticut. Dr. Olin was author of several books on Oriental travel, of *The Relations of Christian Principle to Mental Culture* (1848), and of the posthumous *Lectures and Addresses* (1852), *Sermons and Sketches* (1852), *College Life: Its Theory and Practice* (1867). Consult *The Life and Letters of Stephen Olin* (New York, 1852).

OLINDA, ô-lēɴ′dȧ. A town in the State of Pernambuco, Brazil, situated on the coast 4½ miles north of Pernambuco, with which city it is connected by a street railway. The town was founded in 1535, it being the first settlement and for a long time the most important commercial city of north Brazil. It was the capital of the Province of Pernambuco and of the Dutch colony established there in the seventeenth century. The Dutch burned the town and made the neighboring Recife (now Pernambuco) the capital. Olinda long remained a favorite place of residence of wealthy Pernambucans, but it has now fallen into decay. It is the seat of a bishopric. Pop. (est.), 10,000.

OLIPHANT, ŏl'ĭ-fant, Laurence (1829–88). An English author, traveler, and mystic, son of Sir Anthony Oliphant. He was born at Cape Town, passed his early boyhood in England, and in 1841 went to Ceylon, where his father was Chief Justice. Subsequently he traveled with his parents in Europe (1846–47), returning to Ceylon as private secretary to his father. Oliphant practiced there as criminal lawyer and was also called to the English and the Scottish bar. He spent the year 1852 in Russia and the Crimea, the next two years in Canada and the United States as secretary to Lord Elgin, Governor-General of Canada. He fought at Sebastopol and, under Omar Pasha, at the battle of Ingour (1855); at New Orleans engaged in a filibustering expedition (1856); in China and Japan with Lord Elgin (1857–59); and with Garibaldi in Italy (1860). The following year he was appointed secretary to the British legation in Japan, where he was dangerously wounded by assassins, and afterward he traveled in Egypt, Poland, and Palestine. Oliphant was elected to Parliament in 1865, but two years later resigned to join the brotherhood founded by T. L. Harris (q.v.) at Brocton in western New York. He married in 1872, and his wife and mother joined the community. For years the Oliphants were the spiritual slaves of Harris, but they finally came to distrust him. After breaking with him Oliphant settled for a time at Haifa in the Bay of Acre, where he devised schemes for restoring the Jews to the Holy Land and wrote *Altiora Peto* and several mystical works. He died at Twickenham, near London, Dec. 23, 1888. Oliphant served as special correspondent for the *Times* on various occasions and was a brilliant journalist. His many published books are mostly accounts of his travels. Among them are: *A Journey to Khatmandu* (1852); *The Russian Shores of the Black Sea* (1853); *Earl of Elgin's Mission to China and Japan* (1857–59). His strange, erratic character is boldly displayed in *Episodes in a Life of Adventure* (1887); his religious opinions in *Sympneumata* (1886), *Scientific Religion* (1888), and his novel *Massollam* (1886). What he might have been may be seen in his novel *Piccadilly* (published 1870; in *Blackwood's Magazine*, 1865), a brilliant satire on English life. With less success he worked the same vein in *Altiora Peto* (1883). Consult the *Memoir of the Life of Laurence Oliphant and of Alice Oliphant, his Wife*, by his cousin, Margaret Oliphant (Edinburgh, 1891).

OLIPHANT, Mrs. Margaret Oliphant (born Wilson) (1828–97). A British novelist and miscellaneous writer, born at Wallyford, near Musselburgh, Midlothian, Scotland, April 4, 1828. In 1852 she married her cousin, Francis Oliphant, who died at Rome in 1859, leaving her penniless with three children to support. Already favorably known as a novelist, she could gain a livelihood with her pen, but the story of her efforts to rear her children and look after her helpless kinsfolk is a painful one. Her work during the next 40 years, in spite of rapid production, is of a good quality, both in fiction and in literary history, but it never marks her as a great writer. In 1864 she again went to Italy and in 1890 visited the Holy Land. She died at Windsor, June 25, 1897. Her first novel, *Passages in the Life of Mrs. Margaret Maitland of Sunnyside* (1849), won instant attention and approval by its exquisite delineation of Scottish life and character. It was followed by, notably, *Merkland* (1851); *Adam Graeme of Mossgray* (1852); *Henry Muir* (1853); *Magdalen Hepburn* (1854); *A Quiet Heart* (1854); *Zaidee* (1856); and several other novels, some of which originally appeared in *Blackwood's Magazine*. It was, however, by the *Chronicles of Carlingford*, which owed something to the example of George Eliot, that Mrs. Oliphant's reputation as a novelist was first assured. The first of them, *Salem Chapel* (1863), perhaps indicates a wider and more vigorous grasp than is to be found in any other work of the author. Among succeeding books of hers are: *Three Brothers* (1870); *Squire Arden* (1871); *A Rose in June* (1874); *The Primrose Path* (1878); *Kirsten* (1890); *The Marriage of Elinor* (1892); *A Widow's Tale* (1898). Other works are the *Life of Edward Irving* (1862); *St. Francis of Assisi* (1871); *Memoir of the Comte de Montalembert* (1872); *The Makers of Florence* (1874); *The Literary History of England from 1790 to 1825* (1882); *The Makers of Venice* (1887); *Royal Edinburgh* (1890); *Memoir of the Life of Laurence Oliphant* [her cousin] *and of Alice Oliphant, his Wife* (1891); *The Victorian Age of English Literature* (1892), in collaboration with her son, Francis Romano; *The Reign of Queen Anne* (1894); *The Makers of Modern Rome* (1895); *William Blackwood and his Sons* (1897). Consult her *Autobiography*, edited by Coghill (New York, 1899).

ŎL'ISI'PO or **OLIS'IPO'NA.** See Lisbon.

OLITZKA, ō-lĕts'kȧ, Rosa (1873–). A German dramatic contralto, born in Berlin. Having completed her studies with Désirée Artôt and Julius Hey, she began her career as a concert singer in her native city. Her operatic début took place in Brünn in 1892. During 1892–93 she was a member of the Hanover Opera, and then went to London. Her great success there induced Mr. Damrosch to engage her in 1895 for his season of German opera in New York. Later she was a member of the Metropolitan Opera Company. Upon her marriage to Boris J. Sinai of Chicago, in 1908, she practically retired from the stage, later appearing only in a few performances with the Chicago Opera Company. She was at her best in the great Wagnerian parts.

OLIVARES, ō'lē-vä'räs, Gaspar de Guzmán, Count of Olivares, Duke of San Lúcar de Barrameda, known as the Count-Duke of Olivares (1587–1645). Prime Minister of Philip IV of Spain. Born at Rome, where his father was Ambassador, he received an excellent education at Salamanca, became the friend of Philip IV, his confidant in his amours, and (1621) his Prime Minister, in which capacity he exercised almost unlimited power for 22 years. Olivares was able, and claimed to be earnestly desirous of improving the condition of his country, but he yielded to the ambitions of Philip and plunged Spain into the Thirty Years' War. The war for the subjugation of the Netherlands, which had been resumed in 1621, was waged without success. Resorting to any means to raise money, his oppressive measures caused insurrections in Catalonia and Naples and roused the Portuguese to shake off the Spanish yoke in 1640. Repeated defeats encountered by Spain forced the King to dismiss Olivares in 1643. He died at Toro. Consult F. Silvela's introduction to his edition of the *Cartas de Sor María de Agreda y del rey Felipe IV* (Madrid, 1885–

86), and Antonio Cánovas del Castillo, *Estudios del reinado de Felipe IV* (ib., 1889).

OLIVAREZ. See OLIVARES.

OL'IVE (Lat. *oliva*, from Gk. ἐλαία, *elaia*, olive). A plant of great economic value which has been in cultivation from prehistoric times, belonging to the genus *Olea*, of which there are some 35 species. The cultivated sorts originated from *Olea europœa*. The nativity of the olive is accredited to southern Europe and Asia Minor, and by some authorities to Syria. The tree is of great vitality, specimens being known which are said to be 1000 years old. It sometimes attains a height of 40 feet; has opposite, leathery, grayish-green, smooth, evergreen leaves and drupaceous fruits which vary in color from waxen yellow to black. The area for successful olive culture is restricted by its heat requirements more than by soil or moisture. It enjoys a dry climate and will thrive on a thin soil and produce well if only the pomace is returned to the land from the oil press, since this contains all the compounds derived from the soil. Fertilization and cultivation increase the yield. The trees should be planted at least 33 feet apart each way, and if given the culture usually given prunes or plums will thrive well. The olive thrives best in dry climates like that of Syria and Assyria. It succeeds at the Cape of Good Hope, in Australia, and in California, where it was introduced at an early date by the Spanish missionaries, from which fact the variety most extensively cultivated in California has been called Mission. Areas which were considered unfit for the industry have proved well suited to some of the early sorts lately imported from Spain and Italy. The industry, which was about to decline, has recently become important in the State owing to the increasing demand in the United States for pickled ripe olives, which can not be imported successfully. The United States imports annually about 6,000,000 gallons of edible olive oil and about 5,000,000 gallons of pickled green olives.

OLIVE.

The tree is propagated either from twig cuttings, sprouts or truncheons of old wood set in moist ground, or from gnarled, woody buds that form near the base of the trunk. Such plants begin to bear when from seven to nine years old, and yield crops either annually or in alternate years, the crop reaching its maximum when the trees are about 30 years of age. The fruits are the chief commercial product of the olive. They are used for pickling, drying, and for oil production. In the Mediterranean countries this oil takes the place of butter and the animal fats used by other nations in culinary operations. The wood of the olive tree is very hard, possesses a beautiful grain and color, and is used for ornamental cabinet work. Among the Greeks the olive was sacred to Pallas Athene (Minerva), who was honored as the bestower of it; it was also the emblem of chastity. A crown of olive twigs was the highest distinction of a citizen who had merited well of his country and the highest prize of the victor in the Olympic games. An olive branch was also the symbol of peace, and the vanquished who came to supplicate for peace bore olive branches in their hands.

Two food products of considerable importance are made from olives, viz., olive oil or salad oil and pickled olives. A third product, little known in the United States, is the dried olive, much eaten in Greece and some neighboring countries. Different varieties of olives vary greatly in size, ranging from less than 100 to over 400 to the pound, the majority, perhaps, ranging from 150 to 250 to the pound. The pit constitutes about 20 per cent of the whole fruit, but here a considerable range is also found. Both pulp and pit contain oil. The amount of oil in the pulp in Californian olives ranges from 14 to about 38 per cent; that in the pit from 0.36 to 1.52 per cent.

Whether used for oil making or for pickling the olive should be carefully gathered. The ripe fruit is used for oil making and for pickling, the exact stage when it is best suited for this purpose being a matter which must be learned by experience. The green fruit used for pickling should be gathered when full grown and just before it begins to color and soften. The pickled olives in the American market are made from the green fruit. The pickled ripe olives are becoming increasingly common, and may be recognized by their dark purplish-brown color.

In making pickles from ripe and green olives essentially the same process is followed. The unpleasant acid and bitter flavor is removed by soaking the fruit in a solution of potash lye for a short time or by a longer soaking in water. In addition to removing the unpleasant flavor the lye softens the skin of the fruit, so that the undesirable substances may be more readily extracted by water. Olives treated with lye must be soaked in clear water, which is frequently changed, to remove the potash. They are then placed in weak brine for a short time and afterward in stronger brines. The details of each step of the process vary considerably, and much depends upon skill and experience. An abundant supply of pure water is of the first importance, and great care must be exercised to prevent the growth of molds, etc.

The uses of olive oil and olives as articles of diet are familiar. The former is used chiefly for dressing salads, in cooking, and for frying, the latter as a relish, for seasoning sauces, etc., and for garnishing various foods. It is also used in medicine, a common name being "sweet oil." The oil, like all fats, has a high fuel value (4080 calories per pound) and on this its value as a food depends. The average percentage composition of pickled ripe olives follows: water 64.7, fat 25.9, carbohydrates 4.3, protein, ash, etc., 5.1, the fuel value being 1205 calories per pound; of pickled green olives: water 58.0, fat 27.6 carbohydrates 11.6, protein, ash, etc., 7.8. The fuel value is 1400 calories per pound. It has been claimed that, while the pickled green olive is chiefly valuable as a relish, the pickled ripe olive is really worthy of attention as a wholesome and fairly nutritious food. The above figures show that they have a similar food value. In southern Europe and other regions the preserved ripe olive is used as a staple article of diet. Consult: N. B. Pierce, "Olive Culture in the United States," in *United States Department of Agriculture, Yearbook, 1896* (Washington, 1897); Felix Goldmann, *Der Oelbau in Palästina* (Freiburg, 1897); Eustace Neville-Rolfe, *Report on the Cultivation of the Olive in Italy* (London, 1897); H. L. Jones, "A Great American Olive Ranch," in *World's Work*, vol. iii (New York, 1902); S. C. Mason, "Drought Resistance of the Olive in the Southwestern States," in *United States Bureau of Plant Industry, Bulletin, 192* (Washington, 1911); also publications of the California Experiment Station and the California State Board of Horticulture. See Olive Oil.

OLIVE, Edgar William (1870–). An American botanist, born at Lebanon, Ind. He was educated at Wabash College, Indiana (S.B., 1893), and at Harvard University (S.M., 1895; A.M., 1897; Ph.D., 1902), where he taught botany from 1897 to 1903. As research assistant of the Carnegie Institution he worked at Bonn (1903–04) and at the University of Wisconsin (1904–06). Olive served as professor of botany at the State College of Agriculture and Mechanical Arts at Brookings, S. Dak., and as State botanist from 1907 to 1912, when he became curator of the Brooklyn Botanic Garden. His papers deal largely with diseases of plants.

OLIVE-BACKED THRUSH. See Thrush.

OLIVE BRIDGE DAM. See Plate of Dams.

OLIVE HAIRSTREAK. See Hairstreak, and Colored Plate of Butterflies, American.

OLIVEIRA MARTINS, ō'lė-vā'rȧ mär'tēNs, Joaquim Pedro de (1845–94). A Portuguese writer, publicist, and statesman. Although he had to become a clerk at 14 he continued to read much and to study economics, history, and geography. His *A Circulação fiduciaria* (1878) won him the gold medal of, and membership in, the Lisbon Royal Academy of Sciences. He was elected president (1880) of the Oporto Society of Commercial Geography, and became director (1884) of that city's Industrial and Commercial Museum. In 1886 and 1887 he was a member of Parliament, in 1889 became administrator of the Tobacco Régie, and in 1890 represented Portugal at international conferences in Berlin and Madrid. When the fourth centenary of Columbus was celebrated at Madrid (1891) he delivered, by invitation, an address at the Ateneo on "Geographical Discoveries of the Portuguese before the Discovery of the New World." In 1892 he became Minister of Finance, later vice president of the Junta do Credito Publico, and in 1893 and 1894 was member of the Chamber of Deputies.

A writer remarkable for the quantity and brilliance of his work, Oliveira Martins was the leader of a national literary revival. His writing is characterized by imagination as well as realism, his style is clear, and irony is used with effect. Especially did his severe morality and the catholicity of his interests make his influence upon contemporaries of the highest importance. Towards the end of his life he published two remarkable books on the fifteenth century: *Os filhos de D. João I* and *A vida de Nun' Alvares*. His unfinished *O principe perfeito* was edited by Henrique de Barros Gomes. Among his other principal works are: *Camões, os Lusiadas e a renascença em Portugal* (1872); *O Hellenismo e a civilisação christã* (1878); *Politica e economia nacional* (1885); and the encyclopædic *Bibliotheca das sciences sociaes* (1880 et seq.). Consult: I. F. da Silva, *Diccionario Bibliographico Portuguez*, vol. xii (Lisbon, 1884); Moniz Barreto, *Oliveira Martins, estudo de psychologia* (Paris, 1887); Anthero de Quental, *Oliveira Martins* (Lisbon, 1894); F. Diniz d'Ayalla, *Os Ideaes de Oliveira Martins* (ib., 1897).

OLIV'ENITE (from Ger. *Oliven-erz*, olive ore, from *Olive*, olive). A hydrated mineral copper arsenate that crystallizes in the orthorhombic system. It has a vitreous lustre and is of various shades of green to brown in color. The crystallized varieties are found in Cornwall, Devonshire, and Cumberland, England, in the Tirol, and in the Ural district, while in the United States it occurs in the Tintic district of Utah, both crystallized and in the fibrous form, the last named being known as wood copper.

OLIVENZA, ō'lė-vān'thȧ. A town of Spain, in the Province of Badajoz, situated near the Portuguese frontier, 15 miles south by west of Badajoz (Map: Spain, B 3). It was formerly a garrison town, but its fortifications have been razed. The town manufactures leather, earthenware, and hats, and has steam flour mills. It was ceded to Spain by Portugal in 1801. Pop., 1900, 8933; 1910, 12,194.

OL'IVE OIL. A clear, bland, yellow to green oil expressed from the olive and largely used as an article of food. The principal fatty matter present is olein, a glycerin ester or glyceride of the unsaturated oleic acid; small amounts of stearin, palmitin and other solid esters dissolved in the olein appear as a heavy crystalline cloud on chilling olive oil.

The olive consists largely of a pulpy mass (80 per cent) surrounding a hard woody pit (17.5 per cent) and seed (2.5 per cent). All contain oil, but the best quality of edible oil is obtained solely from the pulp, while the oil extracted from the pit and seed, known as olive-kernel oil, is found to some extent in medium to low grade edible varieties and all sorts used for lubricating, burning, and soap manufacture. The total oil content of the ripe fruit may reach 70 per cent, of which from 40 to 60 per cent exists in the pulp. These figures may be much lessened, as is the case in California, South Africa, and Australia.

For edible-oil production the fruit is gathered just previous to maturity, when, although the yield of oil is less, the quality is better. For all other purposes fully ripe or decayed and imperfect fruit is used. The old processes of extraction are briefly as follows: the fruit is crushed in a circular court of stone or other masonry provided with a heavy millstone operated by a pole with mule power. After thorough pulping the mass is gathered in rush baskets and pressed in a screw press worked by five or six men. To obtain more oil the pulp is heated and re-pressed, and water is added for the final pressing. The oil is refined by sedimentation.

The newer processes practiced on a large scale employ the most modern machinery and sanitary methods. For producing the finest grades selected hand-picked olives are cleaned, peeled, and pitted; the meats are gently pressed cold, yielding the finest quality of virgin oil.

The press cake from this operation is subjected to hydraulic pressure and furnishes the high-grade oils known as *huile vierge* and *huile surfine*. Those of southern France rank highest, while the Italian varieties are slightly less desirable. By pouring cold water on the press cake and re-pressing a third, inferior variety of edible oil, sold as salad oil, *huile fine*, is obtained. Still a fourth extract is made by mixing the pulp with hot water and again pressing the mass; this very inferior product is used for soap making and lubricating. Green oils used in soap making are prepared from the last pulp residues, partially dried and extracted with carbon disulphide, which dissolves not only chlorophyll but also solid fatty acids.

In the United States strict regulations by Federal and State authorities, make it hardly possible to sell an adulterated oil as genuine. All mixtures of olive oil with cottonseed, sesame, and peanut oils must be sold as salad oils and must disclose the ingredients on the label.

Olive oil forms the basis for potash or soda soaps used in the textile industries and the toilet soap known as Castile. According to legal requirements olive oil should be the clear, bland oil obtained from the sound mature fruit of the cultivated olive tree, free from rancidity, refractive index at 25° C., 1.446–1.468, iodine number 99–90.

In the year 1912 the United States imported about 4,800,000 gallons and produced 350,000 gallons. The percentage of consumption was about 2.5 per cent that of butter.

Consult: Tolman and Munson, *Olive Oil and its Substitutes* (Washington, 1903); Sir T. E. Thorpe, *Dictionary of Applied Chemistry* (rev. ed., London, 1913); E. H. S. Bailey, *Source, Chemistry, and the Use of Food Products* (Philadelphia, 1914); H. C. Sherman, *Food Products* (New York, 1914).

OLIVER, Andrew (1706–74). A lieutenant governor of Massachusetts, brother of Peter Oliver. He was born in Boston and graduated at Harvard in 1724. In 1743 he was elected to the Massachusetts General Court, in 1746 was chosen a member of the Council, and in 1756 became Secretary of the Colony. Upon the passage of the Stamp Act in 1765 he was appointed distributor for Massachusetts, and thus incurred the displeasure of the people. On Aug. 14, 1765, he was hanged in effigy on the Liberty Tree, and a mob destroyed a new building which, it was thought, was intended for his office. He continued, however, to uphold the cause of the crown, and in 1770, on the promotion of his brother-in-law, Hutchinson, to the governorship, Oliver was made Lieutenant Governor in his stead. In 1773 certain letters written by Oliver in which he recommended changes in the Massachusetts charter and hinted at the desirability of taking off the "principal incendiaries," came into the hands of Benjamin Franklin, the agent of the Colony in England, and these letters, together with some from Hutchinson and others, were published in Massachusetts and aroused such a storm of indignation against Hutchinson and Oliver that a petition was sent to England for their removal. The petition was refused, although Hutchinson was superseded a few weeks after Oliver's death at Boston.

OLIVER, Frank (1853–). A Canadian journalist and statesman, born and educated in Peel County, Ontario. In early manhood he went to Winnipeg and later to Edmonton, where in 1880 he founded the *Bulletin*, one of the more influential newspapers of the Canadian Northwest. Entering politics as a Liberal, Oliver served as a member of the Northwest Council (1883–88) and of the Northwest Legislative Assembly (1888–96). In 1896 he was elected to the House of Commons and in 1905–11 he was Minister of the Interior and Superintendent General of Indian Affairs in the administration of Sir Wilfrid Laurier. He was appointed a member of the Royal Conservation Commission in 1909. Oliver continued the progressive immigration policy initiated by Sir Clifford Sifton (q.v.), and did much to procure a large number of superior agricultural settlers for the Canadian Northwest.

OLIVER, George Tener (1848–). An American legislator, also a manufacturer and newspaper publisher. He was born in Ireland while his parents were visiting there. After graduating from Bethany College, West Virginia (A.B., 1868; A.M., 1873), he studied law in an office in Pittsburgh, where he practiced from 1871 to 1881. He then engaged in the iron and steel industry, accumulating a large fortune. From 1881 to 1884 he was president of the Pittsburgh central board of education, and in 1884 he was presidential elector. Oliver sold most of his holdings about 1899 and purchased the Pittsburgh *Gazette-Times* and, in 1900, the *Chronicle-Telegraph*. In politics an active, conservative Republican, in 1904 he declined appointment to the United States Senate to succeed Matthew Quay, but in 1909, on the resignation of Senator Knox, he was elected for the unexpired term and in 1911 for the full term.

OLIVER, Henry Kemble (1800–85). An American musician, born at Beverly, Mass. He graduated at Dartmouth College in 1818 and after teaching school for a number of years settled in Lawrence, Mass., of which city he became mayor in 1859. Some time afterwards he removed to Salem, Mass., and held prominent offices there. From 1861 to 1865 he was Treasurer of the State of Massachusetts. He founded several musical societies, but is better known as the composer of the hymn tunes, "Federal Street," "Morning," and "Beacon Street." He also composed motets, chants, and songs, and published: *The National Lyre* (1848); *Collection of Church Music* (1860); *Original Hymn Tunes* (1873).

OLIVER (or **OLIVIER**), Isaac (c.1556–1617). An English miniature painter, of French extraction. He was born probably at Rouen, but was living in London with his family as early as 1571. A pupil of Hilliard, he was at first influenced by that master, but his work is simpler, more effective, and stronger in characterization. The J. Pierpont Morgan collection in the Metropolitan Museum, New York, contains many important examples of his skill, including miniatures of Philip II of Spain, Queen Anne of Denmark, Sir Philip Sidney, Lord Brooke, and the Earl of Essex. The Victoria and Albert Museum, London, possesses a magnificent full-length miniature of Sackville, Earl of Dorset, and the Duke of Buccleuch's collection the fine miniature of the Countess of Nottingham. Oliver is well represented in many other private collections in England, including that of the King.

OLIVER, James Edward (1829–95). An American mathematician, born at Portland, Me. He graduated at Harvard in 1849 and in 1850 was appointed assistant in the office of the newly established *Ephemeris and Nautical Almanac*, from which he resigned in 1867. After three years of research in chemistry and physics he was chosen professor of mathematics in Cornell, where, in 1873, he became senior professor. He wrote *A Treatise on Trigonometry* (1886) and edited a series of mathematical textbooks.

OLIVER, Peter (1594–1648). An English miniature painter. He was born probably in London, the son of Isaac Oliver. Peter Oliver was a follower of Van Dyck, and as he also painted large portraits in oil, he may have been responsible for numerous English portraits ascribed to the Flemish painter. He is known, however, for his miniatures, which resemble those of his father but are less vital. He was employed by Charles I to make copies in miniature of the pictures in the royal collection at Whitehall, and one of these, "The Marriage of St. Catharine," after Titian, is in the Morgan collection (Metropolitan Museum, New York). Good examples of his portraits also are to be found in the Morgan collection and in the important private collections of miniatures in England, including the three grandsons of Viscount Montague, in the possession of the Marquis of Exeter, and Charles Louis, Count Palatine, at Montague House. A series of his pen drawings is preserved in the British Museum.

OLIVER, Peter (1713–91). An American jurist, a brother of Andrew Oliver. He was born in Boston and graduated at Harvard in 1730. After holding various minor offices he was, in 1756, although not a lawyer, made a justice of the Superior Court of Massachusetts and in 1771 was raised to the position of Chief Justice. Like his brother Andrew he was a Loyalist, and in 1774 was the only one of the judges to refuse to decline the offer of a fixed salary from the King. Because of his refusal he was impeached by the House. He upheld the royal cause with considerable skill in the *Censor*, a Loyalist paper, and upon the evacuation of Boston by the British in 1776 he quitted the town with them. The remainder of his life was spent in England.

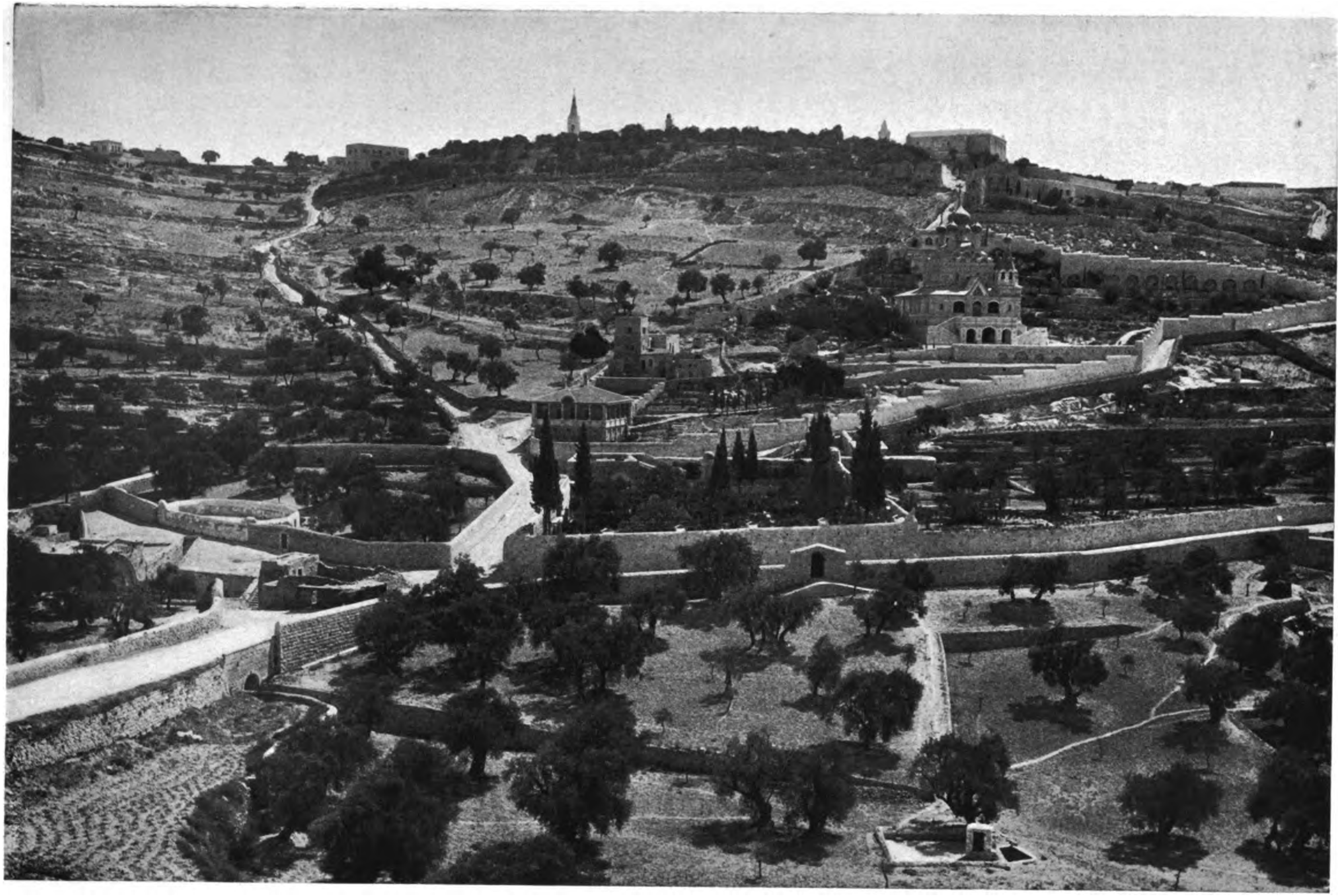
OL′IVERS, Thomas (1725–99). A Methodist preacher. He was born at Tregynon, Wales, received little schooling, and became a wandering cobbler. Being in Bristol, he went to hear Whitefield, was converted, and was made by John Wesley an itinerant preacher. In 1775 he became coeditor of the *Arminian Magazine*, but was removed in 1789 on the charge of carelessness. He died in London. His repute rests upon his hymns, one of which, "The God of Abraham praise," is widely used. It is, however, not original, but a paraphrase from the Hebrew doxology of Daniel ben Judah, which summarizes the 13 articles of the Hebrew creed. Consult the article on the hymn in Julian's *Dictionary of Hymnology* (London, 1892) and Rev. John Kirk's *Memoir of Olivers* (London, 1868).

OL′IVER TWIST. A novel by Charles Dickens (1838). It appeared serially in *Bentley's Miscellany* between January, 1837, and March, 1839.

OL′IVES, Mount of (also called Mount Olivet, Acts i. 12; known to-day by the Moslems as Jebel et Tûr, the mountain of the tower, and by the native Christians as Jebel ez Zeitun, the mountain of olives). The mountain east of Jerusalem, separated from the city by the Kidron valley and parallel with the temple hill. It is, properly speaking, but one of a range of hills which runs south from the central highland about 2 miles north of Jerusalem. Just north of the city is the high elevation known in ancient times as Scopus (prospect), the modern Meshârif, where the Roman army under Titus encamped. After a depression the range deflects and is continued southward for about 2 miles by the Mount of Olives, which is divided into four summits by low intervening depressions. Farther south (and deflecting to the southwest) is a third hill, the Mount of Offense (the modern Batu el Hawa), where, according to tradition, Solomon erected altars for the heathen gods of his foreign wives. (1 Kings xi. 7–8; 2 Kings xxiii. 13.) On the steep western slopes of the Mount of Offense lies the village of Siloam (the modern Silwan), and in the valley between this mount and the Mount of Olives is one fork of the road to Jericho, on which lay Bethany, whence Jesus started on his triumphant entry into Jerusalem. (Mark xi. 1.) A small spur running south is sometimes called the Hill of the Prophets because of a "Tomb of the Prophets" formerly considered ancient, but now deemed to be not earlier than the 4th or 5th century A.D. On a spur to the southeast was located Bethany (the modern squalid village of El ’Azarîyeh). The height of the Mount of Olives averages over 2600 feet, about 200 feet higher than the city. The highest point, the northernmost of the four summits, known as the Viri Galilæi, so named because of the tradition which arose in the thirteenth century that the "men of Galilee" referred to in Acts i. 11 were addressed here after the ascension—the modern *Karem es Sayyad* (the vineyard of the hunter)—is some 2730 feet above sea level. The southern summit, on which is the modern Moslem village of *Kefr et Tûr* (the village of the tower), is of about the same height. The name, Mount of Olives, has come down from early times (cf. 2 Sam. xv. 30), and there is thus reason to believe that it was once largely covered with olive trees. In fact, in the gospel times it must have been thickly planted, not only with olives, but with figs and palms, as the names of the villages Bethany (house of dates) and Bethphage (house of figs) would indicate. During the siege by the Romans (70 A.D.) the trees were all cut down, and it has to-day only to a certain extent recovered its early condition.

As early as the days of David the mount appears to have had on it a sanctuary, perhaps originally instituted by the Canaanites and afterward appropriated by the Israelites. (2 Sam. xv. 32.) From its commanding situation, east of the temple hill, as a great protecting wall before the city, the Mount of Olives was regarded with veneration by the Jews. It was called the Mountain Light, because there used to be lighted on it the beacon fire to signalize the appearance of each new moon. In prophecy (Zech. xiv. 4; Ezek. xi. 23) and in rabbinic teaching it plays a rôle in the scenes of judgment connected with the Messianic era.

The mountain was the scene of several important incidents in Jesus' ministry. On its western slope, near the road leading down to the main eastern gate of the city, lay the Garden

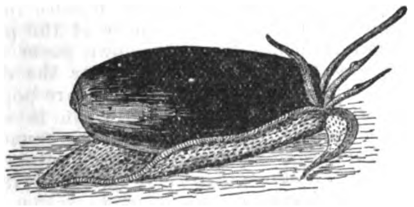


THE MOUNT OF OLIVES

of Gethsemane (q.v.), whither he often resorted for prayer and where he was arrested. (Luke xix. 29–54.) It is held by some that here Nicodemus sought him for the interview given in John iii. (Ramsay, *Education of Christ*, pp. 73–76.) Somewhere on the same roadside he sat and discoursed to the disciples concerning the coming doom of the city opposite (Mark xiii. 1–3), and in his triumphal entry he passed down its slope on the same highway. (Luke xix. 29, 37.)

Christian tradition has altered and amplified the notices in the Bible by transferring the scene of the ascension from near Bethany to the summit of Olivet (Luke xxiv. 50; cf. Acts i. 12), where two different spots claim the honor. One of these, on the southern summit directly east of the old temple site, is occupied by the church of the Ascension, a small modern building, but on the ruins of a church built in the fourth century. It is in possession of Moslems, but Christians are permitted to use it on certain occasions. The rival spot is on the northern summit (Viri Galilæi), Scopus, now the property of the Greek Catholic bishopric of Jerusalem and well cared for. On this hill extensive catacombs have been recently discovered, indicating that it was once a Jewish burial place, afterward appropriated and enlarged by Christians. On the southern summit the Russians have built a six-storied tower, affording an extensive view of the city and its environs. South of the church of the Ascension are the possessions of the Latin church, with the two chapels, that of the Creed, where the Apostles are said to have formulated the Apostles' Creed; and the Pater Noster, built by a French princess in 1865. Deep down in the valley, just east of the bridge across the Kidron, is a chapel over the legendary site of the grave of Mary, mother of Jesus, whence according to tradition her body was carried by the angels to heaven. Consult reports of the Palestine Exploration Fund, especially volumes for 1889 and 1896 (London); R. Hofman, *Galilaea auf dem Oelberg* (Leipzig, 1896); Baedeker, *Palestine and Syria* (ib., 1906); L. G. Leary, *The Real Palestine of To-Day*, chap. xi (New York, 1911). See JERUSALEM, and the references there given.

OLIVE SHELL. A mollusk of the gastropod family Olividæ, which has a beautiful shell that resembles an olive in general shape. Many species, whose shells are brilliantly ornamented, inhabit the Indian Ocean and Australian seas. They occur at various depths down to 50 feet or so, and creep about the bottom, seizing and feeding upon small animals and carrion, from which they suck the juices.



OLIVE SHELL (*Oliva maura*).

OLIVE-SIDED FLYCATCHER. A migratory tyrant flycatcher (*Nuttalornis borealis*) of North America, which is slaty brown above, with darker streaks, and olive gray below, with the median line of the abdomen white. It frequents mountains and northern pine forests and makes its nest on the branch of a pine or similar tree. The eggs are cream-colored, marked with reddish-brown and lavender spots. Few breed south of Canada, except in northern New England. Consult Baird, Brewer, and Ridgeway, *History of North American Birds*, vol. ii (Boston, 1875). See Colored Plate of EGGS OF SONG BIRDS.

OLIVÉTAN, ō'lā'vȧ'täɴ', or **OLIVETANUS**, PIERRE ROBERT (c.1506–38). A French Reformed theologian, born at Noyon and educated in law at Paris and Orléans. He was a kinsman of Calvin and is credited with stimulating him to theological studies. Olivétan taught at Geneva, and was then banished to Neuchâtel. His great work was a version of the Bible, a basis for the work of subsequent scholars; it was published at Neuchâtel (1535) and at Geneva (1540). In 1536 he went to Italy and he died at Ferrara.

OL'IVET'ANS. A religious order of the Roman Catholic church, one of the many remarkable products of the great spiritual movement which characterized the twelfth and thirteenth centuries. The Olivetans, or Brethren of Our Lady of Mount Olivet, are an offshoot of the great Benedictine Order and derive their origin from Giovanni de' Tolomei, a native of Siena, born in the year 1272. Tolomei had been a distinguished professor of philosophy in the university of his native city, but his career was suddenly interrupted by the loss of his sight. Although he was cured of his blindness (miraculously, as he himself believed), this visitation convinced him of the vanity of earthly things, and in company with some friends he withdrew to Monte Oliveto, near Acona, between Siena and Arezzo, where he devoted himself to prayer and religious exercises. After this he took the name of Bernard. By the direction of the Pope, John XXII, the new brethren adopted the Benedictine rule; but they chose as their especial province the cultivation of sacred science and the duty of teaching. Their life was one of great austerity and simplicity. In the year 1319 Tolomei was chosen as the first general; and even before his death, in 1348, the institute had made rapid progress, especially in Italy. It numbered at one time 83 houses, but at present the number is reduced to 10, including one in Rome, which contains the grave of St. Frances of Rome. The ancient mother house of Monte Oliveto and the beautiful cloister at Florence have been appropriated by the Italian government, which uses the latter for barracks. Consult Marechaux, *Vie de Bienheureux Bernard Tolomei* (Paris, 1888), and J. A. Symonds, *Sketches and Studies in Italy* (New York, 1898).

OL'IVET COLLEGE. A coeducational institution at Olivet, Mich., established by a colony of citizens from Oberlin, Ohio, under the leadership of Rev. John J. Shipherd, the founder of Oberlin College. The school was opened in 1844 and continued as Olivet Institute until 1859, when a charter was obtained. The institution comprises a collegiate department leading to the A.B. degree and a conservatory of music, with a total registration in 1913–14 of 245 and a faculty of 26. The library contained 35,000 volumes. The college has a campus of 15 acres, valued, with the buildings, at about $250,000, the value of all the college property being about $360,000. The president in 1915 was E. G. Lancaster, Ph.D.

OLIV′IA. 1. In Shakespeare's *Twelfth Night*, a countess sought by Duke Orsino. She falls in love with Viola, disguised as a page, and marries Viola's brother Sebastian, mistaking him for Viola. 2. In Goldsmith's *Vicar of Wakefield*, the vicar's elder daughter. She elopes with Squire Thornhill.

OLIVIER, Isaac. See Oliver, Isaac.

OLIVIER, ō′lē′vyȧ′, Juste Daniel (1807–76). A Swiss poet, born at Eysins (Vaud). He studied at the Academy of Lausanne and afterward taught literature there for several years. After the political troubles of 1845 he went to Paris and remained there until 1871. He then returned to Geneva, where he died. His works include: *L'Avenir* (1831); *Les chansons lointaines* (1847); *Dernières chansons; Théâtre de société fantaisies dramatiques* (1870); and some studies in natural history: *Le canton de Vaud* (1837–41); *Etudes d'histoire nationale* (1842); *Mouvement intellectuel de la Suisse* (1845).

OLIVIERS, Charles Louis Marie Emmanuel Carbon de Flins des. See Flins des Oliviers, C. L. M. E. C. de.

OLIVINE, ŏl′ĭ-vĭn *or* vēn. See Chrysolite.

OLLA PODRIDA, ŏl′yȧ pō-drē′dȧ (Sp., putrid pot). Originally an accumulation of remains of flesh, vegetables, etc., thrown together into a pot, but generally employed to designate a favorite national dish of the Spaniards, consisting of a mixture of different kinds of meat and vegetables stewed together. It has also come to be figuratively applied to literary productions of very miscellaneous contents.

OLLIER, ō′lyȧ′, Léopold Louis Xavier Edouard (1825–1900). A French surgeon, specialist in the pathology of the bones. He was born at Vans, Department of Ardèche, studied medicine at Lyons and Montpellier (M.D., 1856), and became professor of clinical surgery at Lyons in 1877. He was chief surgeon to the Hôtel Dieu (1860–77). It was Ollier who operated (in vain) upon President Carnot after he had been stabbed by an assassin in 1894. He wrote *Traité expérimental et clinique de la régénération des os* (1867) and *Traité des résections et des opérations conservatrices . . . sur le système osseux* (1885–91).

OLLIVANT, ŏl′ĭ-vant, Alfred (1874–). An English novelist, educated at Rugby and Woolwich. From 1893 to 1895 he held a commission in the Royal Artillery. His first book, *Owd Bob, the Grey Dog of Kenmuir* (1898), called *Bob, Son of Battle* in America, the story of a sheep dog, had a great success, rivaling that of Kipling. It was a good dog story and at the same time suggested a human story. His other books, few in number but of high quality, are: *Danny: The Story of a Dandie Dinmont* (1903); *Redcoat Captain* (1907), a juvenile in style with an allegorical content; *The Gentleman: A Romance of the Sea* (1908), an excellent historical novel of the Napoleonic epoch; *The Taming of John Blunt* (1911), the experiences of a Socialist journalist; *The Royal Road* (1912), set in cockney London. Consult W. L. Phelps, *Essays on Modern Novelists* (New York, 1910).

OLLIVIER, ō′lē′vyȧ′, Emile (1825–1913). A French statesman. He was born July 2, 1825, at Marseilles and studied there for the bar. Ledru-Rollin made him commissary general at Marseilles in 1848 and Cavaignac appointed him Prefect of the Department of Bouches-du-Rhône the next year. This demotion caused him to resign from the civil service. He soon resumed his law practice, however, and was elected to the Legislative Assembly from Paris in 1857. As one of the five that constituted the opposition during the early Empire, he gained great reputation as an orator and compelled Napoleon III to grant some constitutional privileges. Gradually he became a Conservative and finally a Bonapartist. On Jan. 2, 1870, Napoleon III called him to be head of a constitutional cabinet. Ollivier was entirely overreached diplomatically by Bismarck just before the outbreak of the Franco-Prussian War. He sent Benedetti to Prussia to demand a denial that Prince Leopold of Hohenzollen-Sigmaringen was a candidate for the Spanish throne. Accepting without verification the reports of Benedetti's reception, Ollivier entered upon the war "with a light heart," and after the first disasters, discredited, with all his colleagues, he retired, Aug. 9, 1870. During his retirement he interested himself greatly in literature and art and became a member of the French Academy. He had married a daughter of Franz Liszt, and his house became a resort for musical Paris. From 1894 till his death Ollivier was engaged in writing a series of volumes called *L'Empire libéral*, an attempt to justify his conduct at the outbreak of the War of 1870. He sins greatly by omission and the book is considered unreliable. Ollivier died at Saint-Gervais-les-Bains, Aug. 20, 1913. Other works, besides that mentioned, include: *Démocratie et liberté* (1867); *Lamartine* (1874); *L'Eglise et l'état au concile du Vatican* (1879); *Thiers à l'Académie et dans l'histoire* (1879); *Nouveau manuel de droit ecclésiastique français* (1885); *Le concordat et le gallicanisme* (1885); *1789 et 1889* (1889); *Michel-Ange* (1892); *Solutions politiques et sociales* (1894); *Marie-Magdeleine: récits de jeunesse* (1896).

OLMEDO, ōl-mā′dō, José Joaquin (1782–1847). An Ecuadorian poet and statesman, born at Guayaquil. He was educated in Lima, receiving the degree of doctor in jurisprudence, and for a time practiced law in his native city. Afterward he took a prominent part in politics, was a deputy to the Cortes of Spain (1812), a member of the Junta de Gobierno of Guayaquil (1820) and of the Constitutional Assembly of Peru (1824), Minister Plenipotentiary of Peru to London, and Governor of the Department of Guayaquil. He was one of the leaders in the revolution of 1845 and a member of the provisional government. His best-known poem is an ode addressed to General Bolívar as the deliverer of Peru. The works of Olmedo are popular in South America, though his style is somewhat antiquated. They are to be found in J. M. Gutiérrez, *América Poética* (Valparaiso, 1846), the *Poesías inéditas de Olmedo* (1861), and Pablo Herrera, *Apuntes biográficos de D. J. J. Olmedo* (Quito, 1887).

OLMSTED, ŏm′stĕd *or* ŭm′-, Denison (1791–1859). An American physicist and astronomer, born at East Hartford, Conn. He graduated at Yale in 1813 and studied theology, but turned to science. Chosen professor of chemistry, mineralogy, and geology at the University of North Carolina in 1817, he held the chair of mathematics and natural philosophy at Yale in 1825–36. Olmsted and Elias Loomis (q.v.) were the first in America to make observations of Halley's comet on its return in 1835. He published a number of works that had a wide circulation, among which were the *Student's Commonplace Books* (1828); *Introduction to Natural Philosophy* (1832); *Introduction to Astronomy* (1839); *Letters on Astronomy, Addressed to a Lady* (1841); *Life and Writings of Ebenezer Porter Mason* (1842).

OLMSTED, Frederick Law (1822–1903). An American landscape architect, the pioneer of this art in the United States. He was born at Hartford, Conn., April 26, 1822. After special studies at Yale in 1843 he sought practical knowledge of agriculture by working on a farm in central New York and subsequently on Staten Island, contributing on rural subjects to technical periodicals. In 1850 he made a tour afoot in England and on the Continent for the study of landscape gardening and agricultural methods. His observations are found in *Walks and Talks of an American Farmer in England* (1852). He then went on a similar quest through the Southern and Southwestern States, studying also the effects of slavery on production, and embodying his experience in *A Journey in the Seaboard Slave States, with Remarks on their Economy* (1856), a new edition of which was published in 1904, with a biographical sketch by F. L. Olmsted, Jr., and an introduction by W. P. Trent; in *A Journey through Texas; or, a Saddle Trip on the Southwestern Frontier, with a Statistical Appendix* (1857); and in *A Journey in the Back Country* (1860). The three volumes were reissued as *The Cotton Kingdom* (2 vols., 1861). In 1856 Olmsted was made superintendent of the New York Central Park Commission, and a plan for this park, prepared by him and Calvert Vaux, was adopted in 1857. In its present aspect this, the first great park of the United States, is, in the main, the product of his design, forming a lasting monument to his skill. In 1861 he was appointed member of a commission of inquiry and advice on the sanitary condition of the United States troops. Of this commission he became general secretary and was active in Washington from 1861 to 1864, visiting also the armies in the field. Later he was prominent on the Southern Famine Relief Commission and in the organization of the New York State Charities Aid Association. In 1871 he presented to the Territorial government of the District of Columbia the plans, since in large measure executed, for the parking system of the streets of the capital. He helped also to found in New York the Metropolitan Museum of Art and the American Museum of Natural History. In 1872 he was made president of the Department of Public Parks in New York, and devised the plan, in large measure carried out, of the street system of New York north of the Harlem River, as well as for Riverside and Morningside parks in New York, Prospect and Washington parks in Brooklyn, Washington and Jackson parks in Chicago, and many others. He planned also the approach from Pennsylvania Avenue to the Capitol in Washington, was first commissioner of the Yosemite Park, and prominent in the Niagara Falls Reservation Committee and in devising the system of parks and parkways in and around Boston. With his partners he planned important park systems for Detroit, Rochester, Montreal, Buffalo, Milwaukee, Louisville, and other cities. In designing naturalistic landscape he has had few, if any, superiors, particularly in his masterly manner of taking advantage of natural features, which determined the character of his design. Olmsted died Aug. 28, 1903. His son of the same name is separately treated.

OLMSTED, Frederick Law (1870–). An American landscape architect, born on Staten Island, N. Y. He graduated from Harvard University in 1894, studied landscape architecture under his father, Frederick Law Olmsted (q.v.), and began practice in 1895. After 1898 he was in partnership with John C. Olmsted, who was also one of the members of the senior F. L. Olmsted's firm. He was chosen (1896) landscape architect of G. W. Vanderbilt's notable estate, Biltmore, N. C., and assumed similar duties for the Metropolitan Park System of Boston in 1898. At Harvard he was instructor in landscape architecture in 1901–03 and thereafter professor. In 1902 Olmsted was a member of the Commission on the Improvement of Washington, and for numerous other cities he devised schemes for beautifying and otherwise improving the streets and parks. Both the National Commission of Fine Arts and the War Department Committee on Niagara Falls claimed his interest. He is author of various articles on city planning, parks, and municipal improvements.

OLMÜTZ, ŏl′myts. The second town of Moravia, Austria, situated on the right bank of the river March, 41 miles northeast of Brünn (Map: Austria, E 2). It was formerly strongly fortified, but its works have been converted since 1886 into promenades and parks. The chief square of the town is the Oberring, adorned with a column dating from 1742 and two fountains. Facing the Oberring is the town hall, with its astronomical clock, constructed in 1422, and an interesting chapel now serving as an historical museum. The cathedral of St. Wenzel, a fourteenth-century Gothic edifice, has a tower 328 feet high, with a huge bell, and the church of St. Mauritius, dating from the eleventh and twelfth centuries, is noted for its fine organ. Among the other interesting buildings may be mentioned the old Jesuit monastery, now used as barracks, the cloth hall, the buildings of the former university, and the archiepiscopal palace. It has a theological faculty, with 200 students (the remnant of the university founded in 1581 and abolished in 1855), two higher Gymnasia, a higher Realschule, three training schools for teachers, a commercial school, a nurse's school, an historical and an industrial museum, a library with (1913) 78,000 volumes, 1700 incunabula, and a number of manuscripts. The town has been the seat of an archbishop since 1777. Olmütz has a number of breweries and manufactures hardware, tin, wire, chemicals, sugar, chocolate, leather, and flour. The commerce in agricultural products is of some importance.

It is mentioned as a town with a castle in 863. In 1063 it became the seat of a bishopric (changed to an archbishopric in 1777), whose incumbents later attained princely rank. Until 1640 it was the capital of Moravia. It was here in 1848 that Ferdinand I abdicated in favor of Francis Joseph. Olmütz is noted for the conference held there in 1850 between the representatives of Austria, Prussia, and Russia for the adjustment of the difficulties which had arisen between Austria and Prussia as a result of the convulsions of 1848–49. In this conference the policy of Austria triumphed completely and all hopes of a liberal Germany under Prussian leadership disappeared for the time. Pop., 1900, 21,933; 1910, 22,245, mostly Roman Catholics, and two-thirds German. Consult Müller, *Geschichte der königlichen Hauptstadt Olmütz* (Olmütz, 1895).

OL'NEY. A city and the county seat of Richland Co., Ill., 119 miles east of St. Louis, on the Baltimore and Ohio Southwestern, Illinois Central, and Cincinnati, Hamilton, and Dayton railroads (Map: Illinois, H 8). It is interested mainly in agriculture and in exporting the fruit, hay, and seed of this region, and has flouring mills, brick and tile works, a cold-storage plant, and a creamery. Among the prominent buildings are the Carnegie library, sanatorium, new courthouse, and high school. Olney, first settled in 1843, is governed by a mayor, biennially elected, and a unicameral council. The water works are owned and operated by the municipality. Pop., 1900, 4260; 1910, 5011.

OLNEY, Jesse (1798–1872). An American educator, born at Union, Tolland Co., Conn. He taught in northern New York and in the Hartford Grammar School, was a member of the Connecticut Legislature for 10 terms, and in 1867 was elected State Comptroller. Olney was one of the most prominent educators of his time, and is especially well known for his reforms in the methods of teaching geography, which he began by studying the home of the pupil and sweeping outward in wider circles to township, county, State, and so on. He published: *A Geography and Atlas* (1828); *The National Preceptor* (1831); and many other textbooks.

OLNEY, Richard (1835–). An American lawyer and statesman, born at Oxford, Mass., Sept. 15, 1835. He graduated (A.M.) from Brown in 1856 and from Harvard Law School in 1858, was admitted to the bar at Boston in 1859, and immediately became associated with Judge Benjamin F. Thomas, whose daughter he married in 1861. Olney rose rapidly in his profession and was for many years chief counsel for the Eastern Railroad and later for the Boston and Maine, as well as for other roads. Until 1893 he was not particularly active in public affairs, although he was a Democratic member of the Massachusetts House of Representatives in 1874. In 1893 he was offered the place of Attorney-General of the United States by President Cleveland and accepted it. His most important act while occupying this office arose out of the great railroad riots of 1894. In June of that year he applied to the United States Circuit Court for the northern district of Illinois for an injunction to prevent the strikers from interfering with the United States mails or with interstate commerce. The injunction was granted and, being enforced by United States troops, the strike was broken. The decision of the Circuit Court was later sustained by the Supreme Court, and, as this was the first instance in which the power of injunction had been used for such a purpose, it furnished a precedent of the utmost importance. Upon the death of Gresham, in 1895, Olney became Secretary of State, and continued to hold that position until the end of Cleveland's administration in 1897. In this period it fell to him to conduct the negotiations with England growing out of the Venezuela boundary dispute. His letter to Thomas F. Bayard, American Ambassador to England, designed to inform the British government as to the position of the United States in the matter, attracted much attention both in this country and in Europe. His statement that "to-day the United States is practically sovereign on this continent, and its fiat is law upon the subjects to which it confines its interposition" announced a new and broader interpretation of the Monroe Doctrine. Previous to the Democratic Convention of 1896 Olney was much talked of as a possible candidate for the presidency. Upon the nomination of Bryan and the adoption of the free-silver plank Olney refused to support the Democratic ticket. In 1900, however, he advised the election of Bryan, and gave as his chief reason for so doing the imperialistic programme advocated by the Republicans. Although prominently mentioned for the presidential nomination again in 1904, he continued in political retirement. In 1912 he gave the Democratic ticket his enthusiastic indorsement, and in the following year he was offered the post of Ambassador to England, but he declined on account of his advanced age. Mr. Olney received honorary degrees from Harvard, Brown, and Yale.

OLONETZ, ō-lyō'nĕts. A northern government of Russia consisting of seven districts and bounded by the Government of Archangel on the north, by Vologda on the east, by Novgorod on the south, and by Finland on the west (Map: Russia, E 2). Area, about 49,355 square miles. The northwestern part belongs orographically and geologically to Finland. It is traversed in different directions by rocky ridges not exceeding 1000 feet in altitude and separated from each other by lakes and marshes. The southeast part is flat, with the exception of the northern portion, which is somewhat elevated. Many of the lakes and marshes contain iron ore and the Devonian formations near Lake Onega yield marble and sandstone. There are also found some copper, clays, and mineral springs. Olonetz belongs to the basins of the Baltic and the White seas. Its chief rivers are the Svir; the Vytegra, which communicates with the Mariinsk Canal system; the Sunna, belonging to the basin of the Baltic; the Onega; and the Vyga, flowing into the White Sea. The number of lakes is estimated at over 2000, the largest of them being the Onega (q.v.), Sego, Vigo, and Vadlo. The climate is harsh and moist. The mean annual temperature varies from 34° F. to 37° F. The natural conditions are unfavorable for agriculture, and the local crops only partially suffice for domestic demands. Fishing is carried on extensively. Many of the inhabitants are engaged in lumbering. The manufacturing industries are insignificant, and mining is in a state of decline. Pop., in 1913, 460,100, composed chiefly of Great Russians, but there is also a perceptible admixture of Karelians (a race allied to the Finns) and Tchuds. Capital, Petrozavodsk (q.v.).

OLORON-SAINTE-MARIE, ō'lō'rôɴ'-săɴt'-mȧ'rē'. A town in the Department of Basses-Pyrénées, France, on the Gave d'Oloron, 15 miles southwest of Pau (Map: France, S., D 5). Its principal buildings are the eleventh-century church of Sainte-Croix and, in the residential suburb of Sainte-Marie, a Romanesque-Gothic cathedral also dating from the eleventh century. The town is in an agricultural region and manufactures leather goods, cutlery, chocolate, woolens, and flour. It is a busy town and has a good trade through the passes of the Pyrenees to Spain. It is the Roman Iluro.

During the Reformation it was a stronghold of Catholicism. Pop., 1901, 9078; 1911, 9495.

OLOT, ō-lōt′. A small town of northeast Spain, in the Province of Gerona, situated among the foothills of the Pyrenees (Map: Spain, G 1). It is the centre of an interesting volcanic region and is surrounded by 14 volcanic cones. The lava in and around the town is perforated in many places by blowholes, through which continuous currents of cool air are expelled. Pop., 1900, 8017; 1910, 10,014.

OLÓZAGA, ō′lō′thä-gȧ, SALUSTIANO (1803–73). A Spanish politician, born at Logroño. He studied law, practiced in his native district, Logroño, and in 1831 conspired with other Liberals to assassinate King Ferdinand VII. He fled to France, but returned to Spain after the King's death, was elected to the Cortes, and became a leader of the followers of Queen María Christina. In reward for his services the Queen sent him to Paris as Ambassador (1840). In 1843 he formed a Progressist ministry, from which opposition on the part of the Cortes forced him to resign. He was threatened with a judicial inquiry into his actions, and escaped to Portugal and London, returning to Spain in 1846. Olózaga took a prominent part in the adoption of the constitution of 1855; received his ambassadorship in Paris again and held it for 10 years, when he was ousted by O'Donnell's revolution. After the deposition of Isabella in 1868, for which Olózaga had striven, he was for the third time appointed French Ambassador. He was a member of the academies of Jurisprudence and of Moral and Political Sciences and of the Royal Spanish Academy of the Language.

ÖLS, or **OELS,** ēls. A town in the Province of Silesia, Prussia, formerly capital of a principality, on the Oelsbach, 17 miles northeast of Breslau (Map: Germany, G 3). Its castle, built in 1558, is the property of the Prussian Crown Prince. Among its churches are the Schlosskirche, from the twelfth century, and the Gothic Propstkirche, from the fourteenth century. There are manufactures of agricultural machinery, cloth, church bells, lumber, files, wagons, and shoes. Pop., 1900, 10,580; 1910, 11,717. Oels was founded in the tenth century.

OLSEN, ōl′sen, OLE (1850–). A Norwegian composer, born at Hammerfest. He received his first musical instruction from his father, a talented amateur. After three years of study with F. Lendermann in Drontheim he entered the Leipzig Conservatory, where his teachers were Paul, Richter, and Reinecke. In 1874 he settled in Christiania as a teacher and conductor. His compositions, all in very advanced style, began to attract attention, so that in 1884 he was appointed to supervise the city's military music, and in 1899, when the post of general musical inspector of the army was established, he was chosen to fill that important office. His works comprise the operas *Stig Hvide, Lajla, Stallo;* the oratorio *Nidaros;* a symphony in G; two symphonic poems, *Asgaardsreigen* and *Alfedans;* the cantatas *Ludwig Holberg, Griffenfeld, Broderbud, Tourist Cantata;* choral songs *Fanevagt* and *I Jotunheimen;* incidental music to Weilen's *Erik XIV* and Rolfsen's *Svem Uræd;* a suite for piano and orchestra.

OLSHAUSEN, ōls′hou′zen, HERMANN (1796–1839). A German theologian, brother of Justus and Theodor Olshausen. He was born at Oldesloe in Holstein, entered the University of Kiel in 1814, and two years later went to the University of Berlin, where the teaching of Schleiermacher and Neander gave direction to his life studies and writings. In 1817 he was awarded the prize at the festival of the Reformation for an essay, *Melanchthons Charakteristik aus seinen Briefen dargestellt* (1818). This essay brought him to the notice of the Prussian Minister of Public Worship, and he was made privatdocent at Berlin in 1820, passing the next year to Königsberg as professor extraordinary, and in 1827 was elected full professor. He went to Erlangen in 1834. His most notable work is his *Biblischer Commentar über sämmtliche Schriften des Neuen Testaments* (4 vols., 1830 et seq; completed and revised by Ebrard and Wiesinger; Eng. trans., 1847–49; rev. Eng. ed. by A. C. Kendrick, 6 vols., 1853–58). An earlier work adducing from the writings of the first two centuries historical proofs of the genuineness of the Gospels is *Die Echtheit der vier kanonischen Evangelien, aus der Geschichte der zwei ersten Jahrhunderte erwiesen* (1823). His method of exegesis is presented in *Ein Wort über tieferen Schriftsinn* (1824) and *Die biblische Schriftauslegung* (1825). In these latter works he rejects the doctrine of verbal inspiration.

OLSHAUSEN, JUSTUS (1800–82). A German Orientalist, brother of Hermann and Theodor Olshausen. He was born at Hohenfelde, Holstein, studied at Kiel, Berlin, and Paris (under De Sacy), and from 1830 to 1852 was professor at Kiel, filling also the office of curator of the university after 1848. Removed in the latter year by the Danish government, which he had energetically opposed, he became chief librarian and professor at Königsberg (1853–58), then councilor in the Ministry of Education. He retired in 1874. Olshausen's more important works are: *Emendationen zum Alten Testament* (1826); *Fragments relatifs à la religion de Zoroastre* (1829), written in collaboration with Julius von Mohl (q.v.); *Die Pehlewi-Legenden auf den Münzen der letzten Sassaniden* (1843); *Die Psalmen erklärt* (1853); *Lehrbuch der hebräischen Sprache* (1861); *Prüfung des Charakters der in den assyrischen Keilinschriften enthaltenen semitischen Sprache* (1865). Consult Schrader, *Gedächtnisrede auf Justus Olshausen* (Berlin, 1883).

OLSHAUSEN, ROBERT VON (1835–1915). A German gynæcologist, son of Justus Olshausen. He was born in Kiel, studied medicine there and at Königsberg, and taught, as professor of gynæcology at Halle (1862–77) and at Berlin from 1887 until his retirement in 1910. He was ennobled in the latter year. Olshausen became especially famous for his ovariotomies and for his removals of the uterus. He was author of *Diseases of the Ovaries* (Eng. trans., 1887), *Klinische Beiträge zur Gynäkologie und Geburtshilfe* (1884), *Beitrag zu Lehre vom Mechanismus der Geburt* (1901), and editor of the *Zeitschrift für Geburtshilfe und Gynäkologie.*

OLSHAUSEN, THEODOR (1802–69). A German author and politician, prominent in the Patriotic party in Schleswig-Holstein. Justus and Hermann Olshausen were his brothers. He was born at Glückstadt, studied law at Kiel and Jena, and for his part in the demagogic disturbances was forced to live in France and Switzerland until 1830. Then he settled in

Kiel and became an ardent advocate of the independence of the provinces through his paper *Kieler Korrespondenzblatt*. He was imprisoned in 1846 for his bold opposition, but his influence was all the stronger in the revolution of 1848, when he became a member of the provisional government, resigning to enter the Diet. In 1851 he was excluded from the amnesty, went to America and lived in New York City and St. Louis until 1865, when he returned to Hamburg. He wrote two popular works on America, *Geographisch-statistische Beschreibung der Vereinigten Staaten* (1853–55, incomplete) and *Geschichte der Mormonen* (1856).

ÖLSNITZ, ĕls′nĭts. A town in the Kingdom of Saxony, Germany, on the White Elster, 1330 feet above the sea and 23 miles southwest of Zwickau (Map: Germany, E 3). The ancient Jakobskirche and a handsome Rathaus are the only buildings of note. Its schools give instruction in trade and textile making. The town has one of the largest carpet factories in Germany. Corsets, curtains, machinery, varnish, dyes, cartons, lacquer, cement, leather, and bricks are also manufactured and there is considerable trade in cattle. There is some pearl fishing. Pop., 1900, 13,606; 1910, 13,951.

OLT. See ALUTA.

OLTEN, ŏl′ten. A town of the Canton of Solothurn, Switzerland, 1310 feet above the sea and 36 miles northeast of Bern, on the left bank of the Aar (Map: Switzerland, B 1). It has numerous excellent modern buildings, a museum, and a library with 15,000 volumes. The town is an important railway junction, with railway shops, electric plants, extensive shoe and felt factories, manufactures soap, machinery, dyes, and automobiles, and is a noted tourist·resort. Pop., 1900, 6969; 1910, 9376.

OL′TIS. See LOT (second article).

OLUFSEN, ō′lụf-sĕn, OLUF CHRISTIAN (1764–1827). A Danish economist and playwright. He studied law, surveying, and agriculture. His comedy *Gulddaasen* (1793), popular to our day, holds an isolated position in Danish comedy between Holberg and Heiberg. Olufsen edited *Oekonomiske Annaler* (12 vols., 1797–1810; 3 vols., 1812–20), wrote *Lærebog i den danske Landökonomi* (1805), and after becoming professor at the university (1815), published *Grundtræk af den praktiske Statsökonomi* (1815) and works on the history of Danish industry and economic conditions.

OLYM′PIA (Lat., from Gk. 'Ολυμπία). The scene of the celebrated Olympic games (q.v.) held every four years by the Greeks. It was situated in the Pisatis, the southeastern district of Elis (q.v.), where the Cladeus joins the Alpheus (Map: Greece, Ancient, B 3). It was never a town, but only a sanctuary with the buildings connected with the worship and the games. The central spot was the Altis, or sacred inclosure, an irregular quadrangle about 200 meters from east to west and 175 meters from north to south. On the west and south it was inclosed by a wall in Roman times, and at this period was somewhat enlarged, as there are traces of an earlier inner Greek wall. On the north was the hill of Cronos, the Prytaneion (see PRYTANEUM), and the row of Treasuries; on the east the Stadium, to which a vaulted passage led, the Echo Portico opening into the Altis and southeast building, which seems to have been demolished to make room for a Roman house built for the Emperor Nero. Within the inclosure the chief structures were the temples of Zeus and Hera (the Heræum), the Metroön (the temple of the Great Mother of the Gods), the Pelopion, the Philippeion, and the great altars. The oldest place of worship seems to be marked by the remains of a great altar south of the Heræum and evidently antedating that temple, as the earth and ashes containing very rude bronzes extended under the foundations. The Heræum was the eldest temple, and is probably the oldest Doric building known. It was hexastyle and peripteral, with 16 columns at the sides. The walls were of crude brick on a stone foundation; the colonnade was originally of wood, but these columns were gradually displaced by stone, a fact which has led to a great variety in the capitals. In the second century after Christ the building seems to have contained many ancient relics and works of art, among them the venerable chest of Cypselus, covered with scenes from Greek legend, in early Corinthian style, and the Hermes of Praxiteles (q.v.), the great prize of the German excavations. In the southwestern part of the Altis was the great temple of Zeus, erected by the Eleans about 460 B.C., and containing the colossal statue of the god in gold and ivory by the Athenian Phidias (q.v.). The sculptures of the pediments and metopes, though the artists are unknown and the very school is disputed, are valuable examples of Greek art just before its full development at Athens and Argos. (See GREEK ART, *History*, *Transitional Period.*) The Pelopion was an irregular inclosure consecrated to Pelops (q.v.). The Philippeion was a circular Ionic building, erected by Philip of Macedon after the battle of Chæronea and containing statues of Philip, his parents, his wife Olympias, and his son Alexander, all by the Athenian Leochares. Besides the buildings the whole inclosure was filled with statues of victors and votive offerings, conspicuous among which was the Nike of Pæonius, on a triangular basis about 30 feet in height, erected by the Messenians and Naupactians shortly after 425 B.C. Outside of the Altis lay the Palæstra, or wrestling school, and the great gymnasium where all competitors were obliged to train for at least one month. (See also HIPPODROME; OLYMPIC GAMES.) After the suppression of the games (394 A.D.) the decline of Olympia was rapid. To provide a defense against the barbarian invaders a fort was built in the Altis, of which the temple of Zeus formed the northwest corner, while to provide material for the wall the other buildings were ruthlessly destroyed. Early in the sixth century of our era the temple of Zeus seems to have been overthrown by earthquakes, and inundations of the Cladeus covered the plain with gravel. Though a scanty population still inhabited the place, the rivers frequently flooded it, and finally buried the whole field, in some places to a depth of 20 feet. Suggestions as to excavations were made by Montfaucon and Winckelmann, and in 1829 the French expedition to the Morea worked for a time at the temple of Zeus and secured a few pieces of sculpture. The final excavation was due to Ernst Curtius (q.v.), who aroused the interest of the Prussian Crown Prince (afterward the Emperor Frederick) and secured the support of the German government. From 1875 to 1881 the work was carried forward in a masterly fashion, and finally, at an expense of 800,000 marks, the entire Altis and a great part of the surrounding buildings were cleared. A museum was built, and to it were transferred the remains of sculpture that had been found, including the Hermes, the Nike, and the fragments (restored) of the pediment of the temple of Zeus. Preliminary reports were published yearly under the title *Die Ausgrabungen zu Olympia* (Berlin, 1876–82), but the authoritative publication is *Olympia, die Ergebnisse der von dem deutschen Reiche veranstalteten Ausgrabungen*, five volumes of text and four volumes of plates (Berlin, 1891–97). A popular account is G. A. Bötticher, *Olympia* (Berlin, 1882). Consult also: Flach, in Baumeister, *Denkmäler des klassischen Altertums* (Munich, 1889); Laloux and Monceaux, *Restauration de l'Olympe* (Paris, 1889) containing an attempt at reconstruction; Percy Gardner, *New Chapters in Greek History* (London, 1892); Charles Diehl, *Excursions in Greece* (Eng. trans., New York, 1893); K. Baedeker, Greece, 290–309, a good account, with plan, of the ruins and of the museum (4th Eng. ed., Leipzig, 1909); E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910); the article "Olympia," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914, with plan). Ancient Olympia is described by Pausanias (books v and vi), best consulted in the edition of Hitzig and Blümner (Leipzig, 1901) or the translation and full commentary of Frazer (London, 1898; 2d ed., 1913).

OLYM′PIA. A city, county seat of Thurston Co., Wash., and capital of the State, 72 miles by rail southwest of Seattle, on the southernmost inlet of Puget Sound, at the mouth of the Deschutes River on three steamship lines and on the Northern Pacific Railroad (Map: Washington, C 3). The State Capitol is a handsome structure, costing $550,000, and among other prominent edifices are the Temple of Justice (Supreme Court), costing $1,000,000, city library, Federal Building, county courthouse, St. Peter's Hospital, and the Capital National Bank Building and Olympia National Bank. There are three State libraries—law, reference, and traveling. Olympia is an important commercial centre, the port for a great area rich in timber, agricultural, and mineral resources. The oyster industry is extensive and much fruit is grown in the vicinity. The manufacturing interests are promoted by abundant water power, the river, with a succession of three falls, making a descent of more than 80 feet. Lumber is the chief manufactured product, but the city has also ironworks, knitting mills, an extract factory, a large fruit cannery, a brewery, oyster canneries, etc. Settled in 1846, Olympia was laid out in 1851 and was chartered as a city in 1859. Pop., 1900, 3863; 1910, 6996. In 1915 the population was estimated to have almost doubled.

OLYM′PIAD (from Gk. *ὀλυμπιάς*, *olympias*, from Ὀλυμπία, *Olympia*, Olympia). The period of four years that elapsed between two successive celebrations of the Olympic games (q.v.; see also CHRONOLOGY). The use of Olympiads as a convenient system of chronological reckoning among the Greeks was of comparatively late date. Timæus (c.300 B.C.) seems to have been among the first to date events by Olympiads, and after him the addition of the separate years in the period was introduced. The name of the winner of the foot race in the games was frequently used with or instead of the number of the Olympiad. The first Olympiad, or that of Corœbus, begins with the year 776 B.C. (See OLYMPIC GAMES.) As the Olympic games did not coincide with the beginning of any calendar year in use among the Greeks, most of the writers call the Attic or Macedonian or some other year in which the games fell the first year of the Olympiad, though even here there are many variations, and the usage of each author must be determined separately. This system is confined to literature, and never appears on coins and only very rarely in late inscriptions. It is sometimes used now by historians in dating Greek events, though commonly the year according to our era is added. The rule for changing dates by Olympiads to years before or after Christ is as follows: Multiply one less than the number of the Olympiad by 4, add the number of the year in the Olympiad, and subtract the total from 777 for dates before Christ, or from the total subtract 776 for dates after Christ. Thus, Ol. $81.3 = 454$ B.C. ($80 \times 4 + 3 = 323$; $777 - 323 = 454$); Ol. $218.2 = 94$ A.D. ($217 \times 4 + 2 = 870$; $870 - 776 = 94$). Simpler is Unger's rule: To find the first year of any Olympiad multiply the number of the Olympiad by 4 and either subtract from 780 or subtract 779, as the case requires. It should be noted that if the date is from an author who reckons by Attic years, allowance must be made for the fact that such years begin about July 1, so that dates in the spring are in an earlier Julian year than those in the autumn.

OLYM′PIAS (Lat., from Gk. Ὀλυμπιάς). The wife of Philip II, King of Macedonia, daughter of Neoptolemus I, King of Epirus, and mother of Alexander the Great. She was married to Philip in 359 B.C. When Philip, after neglecting her, separated from her and married Cleopatra, niece of Attalus (337 B.C.), she withdrew from Macedonia and went to reside with her brother Alexander, King of Epirus. Many have believed that she was implicated to a greater or less degree in the assassination of Philip (336 B.C.). After Philip's death she returned to Macedonia, where she enjoyed great influence under Alexander, especially during his absence in Asia, and helped to bring about the death of Cleopatra and her infant daughter. After the death of Alexander (323 B.C.) she again withdrew from Macedonia to Epirus, where she stayed several years, until the death, in 319 B.C., of Antipater, who had been at the head of affairs in Macedonia, brought her a new opportunity to assert her pretensions to the Macedonian throne. Joining forces with the new regent, Polysperchon, she invaded Macedonia and in 317 B.C. defeated Arrhidæus, the weak-minded stepbrother and successor of Alexander, and his wife, Eurydice, both of whom she caused to be put to death. Being now in power, she followed up her vengeance and caused the execution of many of the Macedonian nobles who had shown themselves hostile to her. Thereupon Cassander (q.v.), her principal adversary, who had previously been in alliance with Eurydice and whose brother Nicanor was one of those put to death by Olympias, marched northward from the Peloponnesus, forced her to take refuge in Pydna, and there besieged her throughout the winter. In the spring of 316 B.C. she was at length compelled to surrender, and was immediately afterward put to death.

OLYM'PIC GAMES. The most famous of the four great national festivals of the Greeks. They were celebrated in the sanctuary of Zeus at Olympia (q.v.) every four years, but, owing to the fluctuations of the Greek lunar calendar (see Calendar; Metonic Cycle), the time varied from the beginning of August to the middle of September. At first the contests occupied only a single day, but in later times five or six days were needed to complete the sports. The origin of the games was lost in antiquity. Legend attributed their foundation to Hercules or to Pelops, who was worshiped with special honor as a hero at Olympia, or to other mythical characters. They were said to have fallen into neglect until King Iphitus of Elis (q.v.) and Lycurgus of Sparta established the "Truce of God" at the celebration of the games and restored them to honor. It was not till much later, however, that the official list of victors began with Corœbus, who won the foot race in 776 B.C. From this date Olympiads (q.v.) were reckoned. The authority of the list, however, is small for any period before the fifth century, as it does not seem to have been compiled before that time, and there are many indications that it was not based on ancient records. According to the accepted belief the earliest and for long the only contest was the stadion, or short foot race. In Olympiad 14 (724 B.C.) the diaulos, or race of two stadia, was introduced, and at the next celebration the dolichos, or long run. In the same year the contestants abandoned the loin cloth and appeared naked, a custom which prevailed ever after. In 708 B.C. the pentathlon and wrestling were introduced, in 688 B.C. boxing, and in 680 B.C. the race for four-horse chariots, to which were added in 648 B.C. the race for ridden horses (see Hippodrome) and the pancratium, a combination of boxing and wrestling. In 632 B.C. contests for boys were established, which from 616 B.C. consisted of running, wrestling, and boxing. In 520 B.C. the foot race for men in armor was added, and in the fourth and third centuries other novelties, especially in horse racing, were from time to time attempted. From 396 B.C. there was a contest of trumpeters and heralds, and the successful competitor in the latter was allowed to show his skill in announcing the victors in the other contests. During the greater part of their existence the games were in charge of the Eleans, though the city of Pisa, in whose ancient territory Olympia was situated, frequently disputed this right, until early in the sixth century Pisa was destroyed by Elis and Sparta. The chief officials were the Hellenodikai, whose number varied from one or two to 12, though the usual number seems to have been 10. Early in the year of the games envoys from Elis were sent throughout the Greek world to invite the states to join in honor to Olympian Zeus, but at first the games seem to have had merely a local character, though they soon became a national festival. To them the states sent theoriæ, sacred embassies, to bring their offerings and vie with one another in the splendor of their equipment and entertainment. The crowd of spectators included representatives of all branches of the Greek race, and many barbarians were drawn by the reputation of the spectacle. Merchants and traders were there in abundance, while poets, orators, and artists exhibited their powers to a gathering which could easily secure a world-wide fame to a successful display.

The competitions were open only to those of Greek descent and free from taint of impiety, bloodguiltiness, or grave breach of the laws. All contestants were required to train faithfully for 10 months before the games, while the last 30 days must be spent at Elis under the eyes of the officials, though it is possible that this was required only of novices. Just before the games the list of entries was prepared, and from that time withdrawal was punished with heavy fines. The order of the events is uncertain, and possibly varied at different times, but the first athletic contest was almost certainly the stadion; the name of the victor here served to designate the Olympiad. The first day of the festival was given to sacrifices, especially to Zeus, while the officials and the contestants took a solemn oath, the former to judge fairly, the latter that they had observed the prescribed training and would compete with fairness. The second day probably began with the foot races, and for these the crowd gathered in the stadion, an oblong plain inclosed by sloping banks of earth. The course was marked at both ends by a marble sill, about 80 feet long and 18 inches wide, in which were two grooves to give a foothold in starting. The finish was always at one end, but the starting point varied for the single and double courses. The length of the course was 600 Olympic feet (the Olympic foot = 0.32045 meter), or about 630 English feet. In the long run the double course seems to have been covered twelve times. Another group of contests was formed by wrestling, boxing, and the pancratium. In the first the object was to throw the antagonist three times, but the struggle was not continued on the ground. Boxing became more and more brutal, for while at first the pugilists wound straps of soft leather over the fingers as a shield and to deaden the blows, in later times hard leather, sometimes even weighted with metal, was used. (See Cestus.) Still the highest praise was won by athletes who owed their success to such perfect defense that they exhausted their opponents without striking a blow or receiving a scratch. In the pancratium, the most severe of the sports, both wrestling and boxing were employed, and the contest continued until one of the contestants acknowledged his defeat. For these contests the competitors were paired by lot, and it was regarded especially creditable to pass through the successive rounds without the rest afforded by drawing a bye, which might occur whenever the number of contestants was uneven. The horse races were run in the hippodrome (q.v.). This sport was naturally confined to the wealthy, but was very popular, and the successful owner received high honor in his state, while princes commemorated their victories on their coins and employed such poets as Pindar (q.v.) to sing their praises. After the horse racing came the pentathlon, or fivefold competition in running, jumping, throwing the javelin and the discus (q.v.), and wrestling. The exact order of the competition and the method of determining the winner are unknown, but it is clear that it was necessary to show decided all-round ability. The running was the short race, or stadion, and the jumping was for distance, not height, but was probably analogous to the modern hop, step, and jump, for the ground was softened to a distance of 50 feet, and we hear of two men who cleared 52 and 55 feet respectively. The javelin was a light spear, and was thrown with the aid of a strap which was wrapped about the shaft, by which a rotary motion and greater distance and accuracy were secured. The discus was a plate of bronze, probably lens-shaped, and much heavier than the one now in use in athletic games (4½ pounds), as the best throw recorded is 95 Olympic feet. The last event of the games seems to have been the race in armor, twice the length of the stadion. At first the runners wore the full armor of a hoplite, but later they carried only the shield. On the last day of the festival the victors received in front of the temple the crowns of wild olive from the sacred tree, which were the only prize, and afterward were banqueted by the State of Elis at the Prytaneion. The victor returned home in triumph to enter the city in a chariot, often through a breach in the walls, with songs and processions. His praises were sung by poets, and in many cities he lived thereafter at public expense.

The games were at their height during the fifth and fourth centuries, when the contestants were of the best blood in Greece. Gradually, however, a change took place, as the training became more and more a profession, and in Roman times, although the crowds and the splendor continued, nearly all the competitors were the professional athletes, against whose mode of life physicians and moralists alike directed their censure. Yet the games continued until 394 A.D., when they were finally suppressed by the Emperor Theodosius, supposedly on the ground that they were opposed to the interests of Christianity.

Modern Olympic Games. Largely owing to the efforts of the Baron Pierre de Coubertin, a number of individuals banded themselves together and organized an international athletic committee, which held its first meeting in Paris in 1895. The object of the committee was to reëstablish the Olympian games by organizing a series of athletic contests to be held once in every four years and to take place at such time and in such country as the international committee might decide. The first games in the modern series were held at Athens in 1896, in a new stadium with seats of Pentelic marble, erected on the site of the ancient Athenian stadium. The patriotic munificence of a wealthy Greek of Alexandria (George Abéroff), together with the efforts of the Greek national committee under the Crown Prince Constantine, alone made this possible. The different competitions were for the most part open to the world. Of 14 first events the United States won 9, Great Britain 3, Greece and Denmark 1 each. The Marathon race (about 26 miles) was won by Loues, a Greek, in 2 hours, 55 minutes, 20 seconds.

The second meet was held at Paris in 1900. Of 22 first events the United States won 17, Great Britain 3, Hungary and France 1 each. The Marathon was won by Teatro, of France, in 2 hours, 59 minutes. In 1904, at St. Louis, Mo., the contests had little international significance, as virtually all of the competitors were Americans. In 1906, at an intermediate meet (under Greek auspices) in Athens, of 23 first events, the United States won 11, Great Britain 4, Greece 3, Sweden 2, and Russia, Austria, and Germany 1 each. The Marathon was won by Sherring, of Canada, in 2 hours, 51 minutes.

In 1908, at London, in all events, Great Britain scored 155 points, the United States 131, Sweden 31, Germany 21, and France 15. The United States, however, was not fully represented in any except the track and field contests, in which the American athletes won 15 first events to 13 for all other contesting nations, the score in points between the leading nations being as follows: United States 114⅔, Great Britain 66⅓, Sweden 12⅓. The Marathon was won by Hayes, of the United States team, in 2 hours, 55 minutes. Dorando Pietri, the Italian runner, who was leading, collapsed just before he reached the goal, and was carried across the line by excited spectators, but was disqualified for having received this assistance.

In 1912, at Stockholm, Sweden, the score in points for all contests was as follows: Sweden 133, United States 129, Great Britain 76, Finland 52, Germany 47, France 32, Denmark 19, South Africa 16, Hungary 16, Norway 16, Canada 13, Italy 13, Australia 13, Belgium 11, Austria 6, Russia 6, Greece 4, Holland 3. As in the previous meets, the United States was not fully represented in any except the field and track contests, in which, as before, the American athletes led all of the other nations, the score by points being as follows: United States 85, Finland 29, Sweden 27, Great Britain 15, Canada 7, South Africa 5, Germany, France, and Greece 4 each, Norway 2, Hungary and Italy 1 each. These standings, however, were affected so far as the United States, Finland, and Sweden were concerned by the disqualification of James Thorpe, the American Indian contestant. Thorpe won the pentathlon and the decathlon contests and thereby the title of champion all-round athlete of the world, but in January, 1913, he confessed that in 1909 and 1910 he had received pay for playing baseball in a minor league. This made him a professional and as such ineligible for the Olympic contests, and incidentally reduced the standing of the United States from 85 to 80, increasing that of Sweden from 27 to 33. (See AMATEUR.) In this meet the Marathon race was won by McArthur, of South Africa, in 2 hours 36 minutes, 54 seconds.

Bibliography. Krause, *Olympia, oder Darstellung der olympischen Spiele* (Vienna, 1838), which is still of value; G. A. Bötticher, *Olympia: Das Fest und seine Stätte* (2d ed., Berlin, 1886); Mommsen, *Ueber die Zeit der Olympien* (Leipzig, 1891); Stengel, "Die griechischen Kultusaltertümer," in Müller's *Handbuch der klassischen Altertumswissenschaft* (2d ed., Munich, 1898); Gardner, *New Chapters in Greek History* (London, 1892); K. Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909); E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910); also *The Olympic Games* B.C. *776–*A.D. *1896*, published with the sanction of the central committee of Athens (2 vols., Athens, 1897); J. E. Sullivan, *Olympic Games, Stockholm, 1912* (New York, 1912).

OLYM'PIODO'RUS (Lat., from Gk. 'Ολυμπιόδωρος, *Olympiodōros*). 1. An historian of the fifth century A.D., born at Thebes in Egypt, who continued the work of Eunapius. In his history ('Ιστορικοὶ Λόγοι), in 22 books, he covered the history of the Western Empire during the period

407–425 A.D. Only a fragment has been preserved to us by Photius.

2. An Alexandrian philosopher of the fifth century A.D., famous for his knowledge of Aristotelianism and as the master of Proclus.

3. One of the latest of the Alexandrian Neo-Platonists, who lived in the sixth century A.D., during the reign of the Emperor Justinian. Of the details of his life we know nothing. Of his writings we possess a life of Plato with commentaries on several of the Platonic dialogues. In these he shows himself to have been a man of large learning and of acute thought; he has preserved for us important parts of the writings of Iamblichus, Damascius, and Syrianus. His *Life of Plato* is best edited by Westermann (Berlin, 1850). The scholia are edited by Fincke (Heilbronn, 1847).

4. An Alexandrian Peripatetic who flourished in the latter half of the sixth century A.D. His commentary on Aristotle's *Meteorology* is still extant, edited by Stüve (Berlin, 1900).

OLYM′PUS (Lat., from Gk. Ὄλυμπος, *Olympos*). The ancient name of several mountains or chains of mountains—e.g., one in northeastern Mysia, two peaks in the island of Cyprus, others in Lycia, Lydia, Cilicia, Lesbos, Elis, another in Laconia, commonly called Lycaon, another near Olympia (q.v.), and, most famous of all, one on the boundary between Thessaly and Macedonia. The last is the highest peak (9754 feet) and greatest mountain mass in Greece, and early appears as the seat of the gods. The mountain is precipitous and rugged, especially towards the sea, but on the lower slopes is well wooded, though the upper part is bare rock, which is snow-covered during a large part of the year. Through the vale of Tempe (q.v.) the river Peneus finds its way to the sea. Even in the Homeric poems is found a transference of the Olympus of the gods from the actual summit of the Thessalian mountain (so the *Iliad*) to a heavenly region free from snow and storm and filled with dazzling light (*Odyssey*, vi, 42–45). It lies above the heaven, though in later usage it seems often indistinguishable from it. This begins in Æschylus and Pindar, and characterizes the later poets, except when they are copying Homer. Traces of the old belief are still found among the peasants who live at Olympus and who tell of strange palaces on the mountain or magic virtues in its air. Consult L. A. Heuzey, *Le Mont Olympe et l'Acarnanie* (Paris, 1860).

OLYN′THIAC ORATIONS. Three speeches of Demosthenes in warm support of the citizens of Olynthus who besought Athens for aid when Philip laid siege to the city. The orations were delivered in Athens in 349 B.C.

OLYN′THUS (Lat., from Gk. Ὄλυνθος, *Olynthos*). A Greek city in Chalcidice (q.v.), at the head of the Toronaic Gulf, near Potidæa (Map: Greece, Ancient, C 1). It was one of the colonies sent out by the Chalcidians and Eretrians of Eubœa. In the autumn of 480 B.C. it was sacked by Artabazus, the Persian general who had accompanied Xerxes to the Hellespont in his retreat and was now returning to Greece. Reestablished by Chalcidians of Torone, it first became prominent as the head of the Chalcidians in their revolt from Athens (432 B.C.). The inhabitants of neighboring villages now gathered within its walls, and when Brasidas (q.v.) appeared the town supported him heartily. During the Peloponnesian War and the early part of the fourth century the region was little disturbed, and Olynthus became the head of a confederacy, which can almost be called a federal state. Treaties and wars with the Macedonians resulted in such an increase of power that Apollonia and Acanthus, which the Olynthians wished to force into the league, and Amyntas of Macedon appealed to Sparta for support. A powerful Spartan force invaded the Chalcidian peninsula, and after some reverses the city was forced to surrender (379) and the confederacy was broken up. Olynthus still remained powerful, but the chief check to the growth of Macedon was removed. Philip, son of Amyntas, at first won the friendship of Olynthus by the gift of Potidæa, which he had taken from Athens, but later hostility arose, and the Olynthians sought an alliance with Athens. Though Demosthenes in his three famous Olynthiacs urged prompt and energetic action, the Athenian succors were inadequate and tardy. In 348 Philip, aided by traitors within, seized the city, leveled it to the ground, and sold the inhabitants into slavery.

OLYPHANT, ŏl′ĭ-fant. A borough in Lackawanna Co., Pa., 5 miles northeast of Scranton, on the Lackawanna River and on the Delaware and Hudson, the Wilkes-Barre and Eastern, and the New York, Ontario, and Western railroads (Map: Pennsylvania, K 3). It is engaged extensively in mining and shipping coal, being in the heart of the anthracite region of the State, and in manufacturing blasting powder, iron and steel goods, cigars, silks, etc. Olyphant is governed by a burgess, elected every three years, and a borough council. The electric-light plant is owned by the municipality. Pop., 1900, 6180; 1910, 8305; 1914 (U. S. est.), 9494.

OM, ōm. A Sanskrit sacred syllable, similar to our Amen, to which especial sanctity and mystic significance is attached. It seems originally to have been an exclamation, an emphatic assent, or solemn affirmation, and instances of its use in that way may be cited early in connection with Vedic literature. Perhaps, as suggested by Böhtlingk and Roth, it was primarily nothing more than an obscuration of the Sanskrit *āṅ*, the result of prolonging and nasalizing *ā*, an asseverative particle. Bloomfield, however, considers it identical with Greek *αὖ*; Latin *au-t*, *autem;* Gothic *au-k*, and meaning "now then," "well now." (*American Oriental Society, Journal*, xiv, cl.) According to Manu, the syllable must be uttered at the beginning of every Vedic recitation and pronounced again at its close; otherwise the sacred knowledge and its merit will slip away, be lost, or prove of no avail. Much of the Upanishads is devoted to the mystic meaning of *ōm*, as summing up in itself all truth. Indian tradition plainly looks upon the word *ōm* as a composite of three elements (*a-u-m*) and as containing the very essence of the three canonical Vedas, and especially in later times *ōm* was regarded as the equivalent or mystic designation of the Hindu Trinity, symbolizing in a word the union of the three great divinities, Vishnu, Siva, and Brahma. See also OM MANI PADME HUM.

OMAGH, ō-mä′ (Ir. *Oigh magh*, seat of the chiefs). The capital of Tyrone County, Ireland, an urban county district, on the Strule, 27 miles south of Londonderry (Map: Ireland, D 2). Its public buildings include a handsome courthouse, endowed and national schools, a district lunatic asylum, a workhouse, a barrack station, and a monument to the soldiers who fell in the South African War. Its trade is chiefly in brown linens, corn, and agricultural produce. Omagh grew up around an abbey founded in the year 792, but is first heard of as a fortress of Art O'Nial at the end of the fifteenth century, about which time it was forced to surrender to the English. Pop., 1901, 4789; 1911, 4836.

OMAGUA, ō-mä′gwȧ, or CAMBEVA. A famous and powerful tribe of Tupian stock (q.v.), formerly centring chiefly about the Marañon (Amazon) from the Javary to the Ica, on the Peru-Brazil frontier, but now mostly retired to the headwaters of the Yapura and Uaupes, southeastern Colombia. Both names signify "flatheads," in allusion to a custom formerly practiced in the tribe. At the time of the Spanish conquest the Omagua were reputed to be the richest and most civilized tribe east of the Cordilleras, with cities, temples, and stores of golden treasure. Three successive attempts were made to conquer their country in 1536, 1541, and 1560, but in each case the invaders were driven back with loss. In 1645 the Jesuit missionary Cujia entered their territory, and after several years of hard work succeeded in gathering them into villages along the Amazon. Forty years later these mission villages numbered 40, all in flourishing condition, and continued to prosper in spite of attacks by Portuguese slave hunters, until the expulsion of the Jesuits from the Spanish colonies in 1767. The mission settlements were gradually broken up, and the Indians retired to the forests and relapsed into their original condition.

They are of fine physique and light complexion, intelligent, industrious, honest, kindly, and cleanly in house and person. They bury their dead in large earthen jars beneath the floors of their huts, the relatives wailing constantly for a month after the funeral. Young men are subjected to a whipping ordeal to try their fortitude, while girls are hung up in a net over a smoldering fire. They have long since abandoned the practice of head flattening. Our knowledge of caoutchouc or India rubber was derived first from this tribe.

OMAHA, ō′mȧ-hą. An important Siouan tribe, formerly claiming an extensive territory on the west side of the Missouri, between the Platte and the Niobrara, within the present limits of Nebraska, and now gathered, together with the Winnebago, upon a reservation in the northeastern part of that State. The name signifies "upper-stream" people, in distinction from the Quapaw, or "down-stream" people. They speak a dialect of the same language used also by the Ponca, Quapaw, Kaw, and Osage, from whom, according to their tradition, they separated at no very distant period. They made a treaty of peace and alliance with the Pawnee in 1800, but were constantly at war with the Sioux, from whom they repeatedly suffered until the United States government interfered and put a stop to hostilities. In spite of war and smallpox they have held their own in population, and number now about 1200, being slightly on the increase. They lived in earth-covered houses, raised corn and vegetables, but also hunted buffalo. Consult A. C. Fletcher, "Study of Omaha Music," in Peabody Museum of American Archæology and Ethnology, *Papers*, vol. i (Cambridge, 1893); ~~id.~~, *The Omaha Tribe* (Washington, 1911).

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OMAHA. The largest city of Nebraska, the county seat of Douglas County, and the commercial and industrial metropolis of the State, 489 miles west by south of Chicago, Ill., on the Missouri River, opposite Council Bluffs, Iowa, and on the Burlington Route, the Chicago, Milwaukee, and St. Paul, the Chicago, Rock Island, and Pacific, the Wabash, the Northwestern lines, the Illinois Central, the Missouri Pacific, and the Union Pacific railroads (Map: Nebraska, J 3). The great bridges which span the Missouri at this point are among the sights of the city and unite it, through Council Bluffs on the east side, with a great radiating system of railways to all points eastward. A belt line encircles the city, affording railway intercommunication.

Omaha is finely situated on a plateau, rising into bluffs which are largely used for residence sites, the business district lying adjacent to the river. From its important position with reference to the West, it has been called the Gate City. It occupies an area of 34.1 square miles, about 1030 feet above sea level and 80 feet above the river, and has 655 miles of broad streets, of which 209 miles are paved. The public park system, 1000 acres in extent, includes the more notable Hanscom, Riverview, Bemis, Miller, Carter Lake, Syndicate, and Elmwood parks and Jefferson Square, connected by a boulevard system of 35 miles. Omaha is the seat of Creighton University (Roman Catholic), including colleges of arts and sciences, medicine, law, pharmacy and dentistry, founded in 1879; the University of Omaha, which includes a Presbyterian seminary; Omaha Medical College (connected with the University of Nebraska); Brownell Hall; Academy of the Sacred Heart; St. Catherine's Academy; Mount St. Mary's Seminary for Girls; 78 public and numerous private and parochial schools; and has several libraries. The public library contains over 125,000 volumes and is located in one of the prominent buildings of the city, with an important branch library building in what was South Omaha. Other architectural features are the city hall, county courthouse, United States Government Building, Army Headquarters Building, high school, office of the Omaha *Bee*, "Woodmen" Building, City National Bank, Omaha National Bank Building, Union Pacific headquarters, the Auditorium (a large convention hall), and Protestant Episcopal and Roman Catholic cathedrals. The State School for the Deaf is in the city, and there are several well-equipped hospitals, among which particular mention may be made of St. Joseph's, Methodist, Emmanuel (Swedish), City, County, and State hospitals. Omaha is the seat of the military headquarters of the Department of the Missouri, with Fort Omaha lying within city limits and Fort Crook adjoining on the south. The city has the extensive shops of the Union Pacific Railway, the great plant of the McKeen Motor Company, and one of the most complete plants in the world for the smelting of ores of gold, silver, copper, lead, and zinc, which come from the mining regions of the West, from Mexico, and from British Columbia. The meat-packing industry, represented by seven distinct plants, has assumed an importance excelled only by Chicago and Kansas City, the stockyards business in some branches leading the world. The city is also fast becoming one of the leading primary grain markets of the United States. Other manufactures include white lead, flour, butter, and food products of all kinds, clothing, boots and shoes, rubber goods, bags and bagging, machinery, steam engines and boilers, ice-making and refrigerating machines, road-building and grading machines, chemicals, furniture, church goods, poultry and dairy equipment, bar fixtures, malt and distilled liquors, and bricks. The trade in live stock, grain, lumber, dry goods, groceries, clothing, boots and shoes, rubber and leather goods, automobiles and automobile supplies is enormous, due to the city's excellent facilities for transportation.

The government is vested in a commission of seven members, chosen every three years, and in subordinate administrative officers appointed by the commission. The board of education is composed of 12 members, elected independently by popular vote. Omaha spends annually in maintenance and operation nearly $4,000,000, the principal items being about $1,400,000 for schools, $650,000 for interest on debt, $300,000 for the fire department, $280,000 for the police department, and $130,000 for municipal lighting. The city carries (1915) a bonded debt of nearly $17,000,000 (including $8,200,000 issued to purchase the city water plant), with an assessed valuation of over $220,000,000. Pop., 1860, 1883; 1870, 16,083; 1890, 140,452; 1900, 102,555, including 23,600 persons of foreign birth and 3400 of negro descent; 1910, 152,904 (Omaha, 124,096; South Omaha, 26,259; Dundee, 1023; Florence, 1526—consolidated by Act of Legislature, April, 1915), including 34,902 persons of foreign birth and 5143 persons of negro descent.

In 1804 Lewis and Clark held a council with the Indians on or near the present site of Omaha, and in 1825 J. B. Royce, a fur trader, built here a stockade and trading station, which, however, soon fell into decay. The first permanent settlement was made in 1854, and from that date to 1867 Omaha (so called from the Omaha Indians, a tribe of the Dakotas) was the capital of Nebraska. It was incorporated as a city in 1857. Its growth was greatly accelerated by the construction of the Union Pacific Railroad, work on which was begun here in 1864. Previous to its completion Omaha was the most northerly outfitting place for overland wagon trains to the Far West. From June 1 to Nov. 1, 1898, the great Trans-Mississippi and International Exposition was held here. On March 23, 1913, the city was visited by a tornado that swept for nearly 4 miles a path from two to four blocks wide through a thickly built residence section; 142 persons were killed and $7,000,000 worth of property destroyed. Consult: Alfred Sorensen, *Early History of Omaha* (Omaha, 1876); Savage and Bell, *History of the City of Omaha* (New York, 1894); L. P. Powell, (ed.), in *Historic Towns of the Western States* (ib., 1901); Morton, Watkins, and Miller, *Morton's History of Nebraska* (Lincoln, 1906).

OMAHA EXPOSITION. See TRANS-MISSISSIPPI EXPOSITION.

O'MAHONY, ô-mä′ô-nê, JOHN (1816–77). An Irish political reformer, born at Kilbeheny, County Limerick. He was educated at a classical school in Cork and at Trinity College, Dublin. Early in his career he became deeply impressed with a sense of the wrongs of Ireland. He was a "repealer," but was more radical than O'Connell, and in 1845 seceded with the Young Irelanders. He joined in the insurrection of Smith O'Brien in 1848, and after its failure fled to France, where he lived for some years in great poverty. In 1852 he went to New York, and there in 1858 was a member of the committee that sent a delegate to James Stephens in Dublin with proposals for the founding of the secret society later known as the Fenian Brotherhood. O'Mahony was one of the most active and influential promoters of the organization, and was for a time its president. In his later years he had a hard struggle to secure the bare means for subsistence. He died in New York in 1877, and his body was taken back to Ireland and buried in Glasnevin Cemetery, near Dublin, with great honors. In 1857 O'Mahony published *The History of Ireland by Geoffrey Keating, D.D., Translated from the Gaelic and Copiously Annotated.* Consult Alfred Webb, *A Compendium of Irish Biography* (Dublin, 1888).

OMALIUS D'HALLOY, ŏ′mȧ′lē̇-ṳs′ dȧ′lwä′, JEAN BAPTISTE JULIEN, BARON D' (1783–1875). A Belgian administrator and geologist, born at Liége. In 1807 he began, upon appointment by Napoleon I, to collect notes for a geological map of the French Empire. It was finished in 1813 and published in 1823. He was appointed successively subintendant of the Arrondissement of Dinant (1814), general secretary of the Province of Liége (1815), and Governor of the Province of Namur (1815), and in 1848 was elected to the Senate. Geology was his avocation, and in recognition of his scientific work he was elected in 1816 a member of the Academy of Brussels and in 1842 a corresponding member of the Academy of Sciences at Paris. In addition to many contributions to the bulletins of the Academy of Brussels and to technical journals, he published: *Essai sur la géologie du nord de la France* (1809); *Mémoires pour servir à la description géologique des Pays Bas, de la France, et de quelques contrées voisines* (1828); *Elements de géologie* (1831; 8th ed., 1868); *Introduction à la géologie* (1833); *Coup d'œil sur la géologie de la Belgique* (1842); *Des races humaines* (1845; 5th ed., 1869); and other volumes.

O'MAL′LEY, CHARLES. The hero of Charles Lever's novel of the same name. The original of the character was an officer in an Irish regiment, Francis G. Keogh, who came to America after the appearance of the book. Keogh was buried in Toronto, Canada.

O'MALLEY, FRANK WARD (1875–   ). An American newspaper man. He was born at Pittston, Pa., studied architecture at Wilkes-Barre (1893–94) and drawing and painting at the Art Students' League, Washington (1894–95), and took courses at the University of Notre Dame, Ind. (1895–98), and at the Pennsylvania Academy of Fine Arts, Philadelphia (1898–1902). He was then several years an illustrator in New York City. After 1906 O'Malley gained a wide reputation as a humorous and special writer for the New York *Sun.* In conjunction with E. W. Townsend he wrote the plays *The Head of the House* (1909) and *A Certain Party* (1910).

O'MALLEY, GRACE (called also GRAINE NI MAILLE, GRANY NE MALE, GRAYN NY VAYLE, GRANEY O'MAILLY, ETC.). A noted Irish chieftainess and sea queen in the sixteenth century. She was the daughter of Owen O'Malley, chief of his clan and admiral of the Connaught fleet, and was born in West Galway about 1535.

During the Elizabethan wars she took constant and active part against the English and their Anglo-Norman supporters, sallying out from Galway Bay at the head of her fleet to destroy the English shipping or ravage the Norman dependencies along the coast. She was twice married, and seems always to have been the dominant partner. In 1557, while cruising on the coast of Kerry, she was captured by the troops of the Earl of Desmond, by whom she was held prisoner for a year and a half. On being released she at once renewed her forays, and in 1578 defeated a strong expedition sent against her, thus making her name so dreaded that she was permitted to ride through Galway city unmolested. Some years later, her husband dying and two of her sons having already been killed, she was induced by a promise of safety to put herself in the power of the English Governor of Galway, by whom she was sentenced to be hanged, but was ransomed by her husband's cousin. In 1591, after several other forays and encounters along the western coast, in one of which she was shipwrecked and forced to remain in hiding for some time, she led a fleet of 20 galleys against some sea rovers from the Hebrides. In 1593, and again two years later, she visited London, and is said to have made submission, but apparently to little purpose, as in 1601 we find record of one of her ships with 100 musketeers being captured by an English sloop of war. Consult *Calendar of State Papers, Ireland, 1574–1601,* passim.

O'MALLEY, Thadeus (1796–1877). An Irish Roman Catholic priest and political writer, born at Garryowen, near Limerick. After his ordination in 1819 he went to America. In 1827 he was suspended on account of his ecclesiastical views, and returned to Dublin to be assistant priest of the cathedral. The first object of his pamphleteering was to obtain a poor law for Ireland, the second to improve the national school system, of which he published his opinion in *A Sketch of the State of Popular Education in Holland, Prussia, Belgium, and France* (2d ed., 1840). Founder of the *Social Economist* (1845), he used a later newspaper which he started, the *Federalist*, for the advocacy of his views, which differed from O'Connell's. O'Malley tried unsuccessfully to unite O'Connell's Old Ireland party with his own Young Irelanders, but after 1870 he was a conspicuous home-rule advocate and a strong supporter of Isaac Butt (q.v.). Though orthodox in faith he was frequently rebuked by his superiors in the Church for the freedom with which he criticized their discipline in such works as his *Harmony in Religion* (1870). His last book was *Home Rule on the Basis of Federation* (1873).

OMAN, ō-män′. An independent sultanate occupying the southeastern end of the peninsula of Arabia. It lies along the Persian Gulf, the Gulf of Oman, and the Arabian Sea from El Hasa to the Hadramaut region (Map: Turkey in Asia, H 6). The area is about 82,000 square miles. The boundaries in the interior are indefinite, the authority of the ruler of Oman being recognized only over a small portion of the territory nominally embraced in the sultanate. The region along the coast is very mountainous, rising in its highest peaks probably to about 10,000 feet. Behind the mountain chains the country gradually passes into the great desert of Arabia. The most favorable part of the country is in the central valleys, which are characterized by a temperate climate and rich vegetation. The chief products are dates, which constitute the main article of export, and other fruits. Pearls and mother-of-pearl and fish are also of some commercial importance. The chief port is Muscat (q.v.). Imports and exports in 1912–13 were valued at 6,953,263 rupees and 4,522,163 rupees respectively. The imports consist of rice, cotton goods, coffee, sugar, silk, arms, etc.

The population is estimated at 500,000 and consists of several tribes of Arab origin, partly nomadic. The negro element is very numerous. At present Oman is practically under the protection of Great Britain. A British consul and political agent is stationed at Muscat, the capital.

History. Muscat was taken by the Portuguese in 1508 and remained in their hands until the middle of the seventeenth century, when the Arabs of the interior secured possession of it. The imams or sultans of Muscat afterward made extensive conquests in eastern Africa, including Zanzibar, Mombasa, and Quiloa. Oman was at the climax of its power and commercial prosperity in the first half of the nineteenth century, when the authority of the imams or sultans of Muscat extended over the Persian territories of Laristan and Mogistan, the islands of Kishm, Bahrein, and Ormuz, the important town of Bender Abbas, part of the coast of Baluchistan, and a long strip of African coast land, including Zanzibar, Mombasa, and Quiloa, together with the island of Socotra. The present ruling family originated in Yemen and was first established in the imamate in the person of Ahmed ibn Said in 1741. The rise of the Wahabi power in Nedjed (see Arabia) resulted in considerable loss of territory. In 1856, on the death of Sultan Said, his possessions were divided between his two sons, one receiving the African territories and the other Muscat with the Persian possessions. These last were lost in 1875. Sultan Thuwany, who succeeded in Muscat, was assassinated in 1866 by his son Selim, who reigned but a short time and was driven out by his uncle, Seyyid Turki ibn Said. In 1888 the latter was succeeded by his son, Seyyid Feisal ibn Turki. He in turn was succeeded by his son, Seyyid Tamur ibn Feysil, in 1913. The relations of Oman with Great Britain have been most friendly. The power of the Sultan is exercised very little beyond the capital, Muscat, the name of which is therefore probably better known in popular usage than that of the whole state. Consult Sahib ibn Razik, *History of the Imâms and Seyyids of Omân,* from the Arabic by G. P. Badger (London, 1781).

O'MAN, Charles William Chadwick (1860–). A British historian, born at Mozufferpore, India. He was educated at Winchester and at New College, Oxford. At this university he became a fellow of All Souls (1883) and deputy professor of modern history (1900) and professor (1905). In the latter year he was elected to the British Academy of Sciences. Edinburgh gave him an honorary LL.D. His valuable works include: *A History of Greece* (1888); *Warwick the Kingmaker* (1891); *A Short History of the Byzantine Empire* (1892); *Europe 476–918* (1893), republished as *The Dark Ages* (5th ed., 1903); *A Short History of England* (1895); *A History of the Art of War in the Middle Ages* (1898); *Seven Roman*

Statesmen (1902); *A History of the Peninsular War*, vols. i–v (1902–14); *The Great Revolt of 1381* (1906); *A History of England before the Norman Conquest* (1910); *Wellington's Army* (1912); *England since Waterloo, 1815–1900* (1913).

O'MAR (Ar. *'Umar ibn al Khaṭṭāb*). The second Mohammedan caliph. He was born about 581. Before the year 617 he opposed the Prophet, but in that year he was won over to the new faith and became one of its ablest supporters. He was associated with Abu Bekr as one of his principal advisers, and on the death of Abu Bekr in 634 succeeded as Caliph and with increased vigor pushed on the wars of conquest which had been undertaken by his advice. The beginning of his reign was signalized by the victory of Kadesia (635) over the Persians. By 637 Omar had completed the conquest of Syria and Palestine. In 639 he sent Amr ibn al As (q.v.) to invade Egypt. In 641 Alexandria fell and the country passed from the Greeks to the Saracens. He was summoned to Jerusalem in 637 to receive the keys of that city. Barca and Tripoli were next subdued by Amr. Armenia was overrun in 641, and about the same time the victory of Nehavend brought Persia under the sway of the Arabs. In 644 Omar was assassinated in the mosque of Medina from motives of revenge by a Persian slave called Firuz, who was a Christian. He lingered five days after receiving the wound, but refused to appoint a successor, and named six commissioners who were to choose one from among themselves. He was buried in the mosque of Medina, near the Prophet and Abu Bekr, and his tomb is still visited by pilgrims. Omar may be called the organizer of the Mohammedan power, as from a mere sect he raised the followers of Islam to the rank of a conquering nation and left to his successor an empire. He was the founder of many excellent institutions; he assigned a regular pay to his soldiers and made some excellent regulations for the more lenient treatment of slaves. He originated the practice of dating from the era of the Hejira (q.v.). Consult: Gustav Weil, *Geschichte der Chalifen* (Mannheim, 1846); August Müller, *Der Islam in Morgen- und Abendland* (Berlin, 1887); Sir William Muir, *Annals of the Early Caliphate* (2d ed., London, 1893); Lammens, "Le Triumvirat Abou Bakr, Omar et Abou-Obaida," in *Mélanges de la faculté orientale* (Beirut, 1910); C. I. Huart, *Histoire des Arabes* (Paris, 1913).

OMAR, MOSQUE OF. A structure on the site of the ancient temple on Mount Moriah at Jerusalem, said to have been built by the Caliph Omar. The Arabic historians, however, maintain that it was erected by Abd al Malik (685–705), and a Kufic inscription in the interior of the building mentions the year 72 A.H. (691 A.D.) as the date of its erection. The name of Abdallah al Imam al Mamun (813–833) is indeed given as that of the builder. But the discrepancy and the different color of this part of the inscription clearly show the name of Al Mamun has been substituted for that of Al Malik. The mosque is octagonal and constructed of colored marbles and tiles. It contains the Sacred Rock, formerly looked upon by the Jews as the site of the intended sacrifice of Isaac. Many scholars think that the *Sakhra* actually represents the place where the altar stood on which the sacrifices of the temple were offered. In Mohammedan belief the rock was the scene of the Prophet's ascension to heaven and bears the imprint of his feet.

OMAR KHAYYAM, ŏ'mär kī-yäm', or more exactly 'UMAR KHAYYĀM (?–?1123). A Persian poet and astronomer. He was a native of the city of Nishapur in Khorassan. The date of his birth is not known, but it was probably before the middle of the eleventh century. His full name is given as Ghiyath ad Din Abul Fath Umar ibn Ibrahim al Khayyami. The name Khayyam (tentmaker) seems to have been derived from his father's occupation.

There are a few general points known about his life. He had a good education for his time, and the excellence of his memory is proved by a report that he could recite by heart, without a mistake, a book when he had read it over seven times. His special training was acquired from an aged teacher of Nishapur, the Imām Muaffak. There is a persistent tradition that two of Omar Khayyam's fellow students were Nizam ul Mulk and Hassan ben Sabbah; the former of these was destined to become famous as the Grand Vizier of Alp Arslan, the latter infamous as the founder of the order of Assassins. There are chronological difficulties in the way of making these three persons contemporaries in their youth, and this has led generally to a rejection of the story. The tale runs thus: The three collegians entered into a compact that whichever should first attain to fortune should aid the other two likewise to success. Nizam ul Mulk's talents and skill elevated him to the position of Grand Vizier to Alp Arslan. Not forgetful of the pledge, he raised Hassan to a position at court which the latter soon abused. On Omar Khayyam, apparently by Omar's own preference, Nizam ul Mulk arranged to bestow an annual stipend of 1200 mithkals, or about $3000 a year, to enable him to follow his chosen pursuits. On the death of Alp Arslan and the accession of Jalal ad Din Malik Shah, Omar Khayyam repaired from Nishapur to the new Sultan's capital, which was then at Merv, and received the appointment of astronomer royal to the court. He was engaged with seven other scientists to reform the calendar, which resulted in the adoption of a new era, the Jalalian, or in Persian Tarīkh-ī-Jalāl, or Malik-Shāhī. This mode of reckoning dated from March 15, 1079 (tenth Ramazan, 471 A.H.). His work on this commission was doubtless in large part only through collaboration, but the results of it are embodied in a series of astronomical tables known as Zīj-i Milik-Shāhī. Besides this work three other mathematical contributions bear Omar Khayyam's name—an unedited monograph on extracting the square and cube roots and another on "Some Difficulties of Euclid's Definitions," while his Algebra, translated by Wœpcke in 1851, was important in the history of mathematics. It was as an algebraist that Omar made his most noteworthy contribution to science. In this respect he stands out as the most notable mathematician of his time. He was the first to attempt a systematic classification of types of equations of the first three degrees and to consider cubics from the standpoint of the general equation rather than as means for solving specific geometric problems. While he could solve certain cubics he was not able to find a general solution. Biquadratics he asserted to be insoluble by geometry, the method always thought necessary for the cubic until after his time. He also knew the rule for expanding a binomial for positive integral powers, a rule afterward perfected by Newton as the binomial theorem (q.v.).

In still other scientific lines Omar Khayyam's intellectual activity found expression; he composed three different books on subjects of natural science and three on metaphysics. But it is in his verse as the author of the *Rubáiyát*, or quatrains, that his name will live.

The first Occidental mention of the *Rubáiyát*, or renowned collection of quatrains, is found in Hyde, *Historia Religionis Veterum Persarum*, pp. 498–500 (Oxford, 1700), but neither this allusion nor notices by Sir Gore Ouseley and others attracted any special attention. It remained for Edward FitzGerald (q.v.) to introduce Omar to the West through a version of 100 of the quatrains. The version is indeed a paraphrase, yet often very close, and it has caught almost exactly the spirit of the original. FitzGerald boldly ventured to rearrange the 100 stanzas that he chose so as to give in a sort of sequence the development of the poet's changing moods. There is no standard manuscript to serve as a norm, and in the manuscript the quatrains are simply arranged in the alphabetic order of the final letter of the rhyme without reference to content. It is not even actually known how many of the quatrains are really Omar's. About 1000 of these four-line stanzas are found, in different works and manuscripts, ascribed to him. Their tone is varied. In some the note is that of revolt against the Divine Master, whose power the slave must nevertheless acknowledge. A number of the quatrains revile the Sufis, yet after all Omar had been trained under Sufi influence, and so may not be wholly free from the mystic tinge. A strain of pantheism runs through many quatrains; while the song of the nightingale, its devotion to the pallid rose whose cheek the springtime causes to blush, the pleasures of love, and the joy of the fleeting hour darkened by the knowledge of inevitable death give a tenderness to others that is truly poetic. The tone of much of Omar's verse was justly regarded as heretical by orthodox Mohammedan Persia; it is often debatable in the West whether the wine and the wine cup be symbolic or Anacreontic. Perhaps the latter is nearer the truth, although some allowance will be made by those who are acquainted with the mystic poetry of Hafiz, Jāmi, Nizami, or Jalal ad Din Rumi.

The date of Omar Khayyam's death is not certain. The year is given as 1111 A.D. (505 A.H.) or as 1123 A.D. (517 A.H.); the latter, however, is much more probable. The story goes that he had prophesied that his grave would be at a place where a fruit tree should shower blossoms upon it, and this has been fulfilled, for his tomb at Nishapur is in the midst of a garden of roses sheltered by fruit trees and bays.

Bibliography. The Algebra of Omar Khayyam was edited and translated by Wœpcke, *L'Algèbre d'Omar Alkhayyâmi* (Paris, 1851). An almost complete bibliography of manuscripts, editions, translations, and imitations of the quatrains is given by N. H. Dole, *Rubaiyat of Omar Khayyam* (Boston, 1896). Edward FitzGerald's rendering into English verse has been constantly reproduced since the first edition at London in 1859. More important from a scholarly point of view are the edition of 500 quatrains with a metrical text translation, by E. H. Whinfield (3d ed., London, 1901), and the elaborate translation, keeping the metrical tricks of the original, by Payne, *The Quatrains of Omar Kayyam, now first completely Done into English Verse from the Persian, with a Biographical and Critical Introduction* (ib., 1898); Edward Heron-Allen, *The Rubaiyat of Omar Khayyam: A Facsimile of the Manuscript in the Bodleian Library, Translated and Edited* (Boston, 1898). Note especially E. F. Thompson, *The Quatrains of Omar Khayyam Translated* (Worcester, Mass., 1906), and id., *FitzGerald's Rubaiyat of Omar Khayyam, with Persian Text and Translation* (ib., 1907). The convenient reissue of Edward FitzGerald with a commentary by H. M. Batson (New York, 1900) is likewise of interest. The mysticism of Omar's poetry is ably treated by C. H. A. Bjerregaard, *Sufi Interpretations of the Quatrains of Omar Khayyam and FitzGerald* (ib., 1902); also Hermann Ethé, "Neupersische Litteratur," in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1894); Grolleau, *Les quatrains* (Paris, 1902); J. K. M. Shirazi, *Life of Omar al-Khayyámi* (Chicago, 1905); E. G. Browne, *A Literary History of Persia* (New York, 1906); F. Rosen, *Die Sinnspruche Omars* (Stuttgart, 1909); J. de Marthold, *Rubaiyat* (Paris, 1910); A. V. W. Jackson, *From Constantinople to the Home of Omar Khayyam* (New York, 1911).

OMAR PASHA, ō′mär pȧ-shä′. A Turkish general. See OMER PASHA.

OMAY′YADS. See OMMIADS.

OMBAY, ōm-bī′. One of the smaller of the Sunda Islands, situated near the east end of the group, 40 miles north of Timor and 260 miles southeast of Celebes (Map: Australasia, E 3). Area, 892 square miles. It is mountainous and volcanic and inhabited almost exclusively by savage tribes of a mixed Malay and Papuan race. At Allor, on the northwest coast, is a Dutch settlement with some trade in wax, pepper, and edible birds' nests.

OMBOS (Gk. *Ὄμβοι, Omboi*). An ancient Egyptian town on the Nile (east bank) in lat. 24° 28′ N., 10 miles south of the Jebel Silsileh (Map: Egypt, C 3). The site, which has long been uninhabited, bears the modern Arabic name of Kôm Ombô (the hill of Ombo). The top of the hills forms a broad plateau upon which are the ruins of the town and of its fine temple buildings. In spite of its excellent strategic position upon an elevation commanding both the river and the route to Nubia, Ombos seems to have been a town of no special importance in the earlier period of Egyptian history. Under the Ptolemies, however, it advanced rapidly, was made the capital of the newly formed Nome of Ombites, and continued to flourish down to a late period under the Roman Empire. The temple buildings, which date from the Ptolemaic period, formerly stood within an inclosure surrounded by a brick wall. Traces of this wall and a portion of the pylon forming the entrance to the inclosure yet remain. Consult: A. E. Mariette, *Monuments of Upper Egypt* (London, 1877); Johannes Dümichen, *Geschichte des alten Aegyptens* (Berlin, 1878); Jacques de Morgan, *Kom Ombo* (Vienna, 1894).

OMBU (ŏm′bōō) **TREE.** A South American shade tree (*Phytolacca dioica*), frequently cultivated in Mediterranean Europe. It grows from

20 to 35 feet high and has a dense spreading head. The leaves are large, thin, smooth, and very numerous. The small, greenish-white flowers are borne in long racemes. The fruit is a fleshy berry, which like the pokeweed (*Phytolacca decandra*) yields a more or less injurious crimson juice. The ombu is also known as tree poke, umbra, and bellasombra. The most striking characteristic of the ombu is the extraordinary development of the base of the trunk, which in old specimens resembles an irregular pedestal, sometimes 15 feet in diameter.

OMDURMAN, ŏm-dōōr′mȧn. The former capital of the successor of the Mahdi, situated on the left bank of the White Nile opposite Khartum (q.v.) (Map: Africa, H 3). It extends for a long distance along the river and contained a population of 48,415 in 1912. Omdurman is noted as the place where the dervishes were overwhelmed by the Anglo-Egyptian troops under Lord Kitchener on Sept. 2, 1898. The town is progressive, containing elementary, primary, and technical schools, at the last of which masonry and carpentry are taught, and it attracts numerous pupils. Its present importance is due to its being the native trading centre of the Sudan.

O'MEARA, ō-mä′rȧ, BARRY EDWARD (1786–1836). An Irish surgeon, notable from his connection with Napoleon I, whom he accompanied to St. Helena as household physician. Early an assistant surgeon in the British army and navy, he was serving with Captain Maitland on the *Bellerophon* when Napoleon surrendered to that officer. Napoleon asked that O'Meara accompany him into exile as private physician, an arrangement to which he acceded, stipulating that he should retain his rank in the navy and be permitted to return to it at pleasure. Of his conversations with Napoleon during a period of about three years O'Meara took notes, which he published as *Napoleon in Exile* (1822). Meantime he became involved, in the interest of Napoleon, in the series of squabbles which he waged with the Governor, Sir Hudson Lowe (q.v.). In 1818, after a violent altercation with Sir Hudson, O'Meara was committed to close arrest and was authorized by the Emperor to resign his post. On his return to England he addressed a letter to the Admiralty, in which, among other things, he accused Sir Hudson Lowe of intentions against the life of his captive, and even of having, by hints, insinuated a desire for his services as secret assassin. For this he was instantly dismissed from the service. Consult R. C. Seaton, *Napoleon's Captivity in Relation to Sir Hudson Lowe* (London, 1903).

O'MEARA, STEPHEN (1854–). An American journalist and police commissioner, born at Charlottetown, Prince Edward Island. In 1864 he went to Charlestown, Mass., where he graduated from the high school in 1872. After serving as a reporter on the Boston *Globe* in 1872–74, he was successively reporter, city editor, news editor, general manager, and editor in chief and publisher of the Boston *Journal* until 1902, when he retired from journalism. Later he became police commissioner of the city of Boston.

OMEGA. See ALPHA AND OMEGA.

OMENS (Lat. *omen*, OLat. *osmen*, prognostic, from *os*, mouth; connected with *auris*, Gk. *οὖς*, *ous*, Lith. *ausir*, OChurch Slav. *ucho*, Goth. *ausō*, Ger. *Ohr*, AS. *ēare*, Eng. *ear*). Events supposed to presage a future event. From prehistoric time it has been a universal belief that any important occurrence is preceded by omens or, to use the traditional English word, by signs, which will allow any observer to forecast what is to be. The notion may be regarded as an anticipation of modern science, but in the absence of adequate knowledge attempts at prediction were of necessity fantastic, and any phenomenon was supposed to indicate good or evil according to the effect which it produced on the imagination. Hence arose a mass of popular rules, handed down from generation to generation, which exhibit great similarity all over the world. The signs noted in Anglo-American folklore are as old as any, and in part date back to a period antedating civilization. Among these omens a great number relate to the principal events of life—birth, marriage, and death. The last, especially, as the chief object of anxiety, has occupied a share of attention sufficiently proved by the bad sense attached to the terms "fatal" and "ominous," while a multitude of occurrences, frequently of an insignificant character, are popularly held to betoken the speedy ending of life. In undertaking a journey good or ill luck is conjectured from the animals encountered on the path. Omens are taken from the flight of birds. Such notice is entirely in the spirit of ancient augury, according to which especial attention ought to be paid to the position and the notes of birds which may be met on the way. Other omens are taken from insects and plants. Marks about the person of babes are supposed to be significant of character. Thus, in English nursery lore a straight line on the palm is regarded as a token of early death, while white and blue spots on the nails are taken to denote good or evil fortune. From such notions, originally of a simple nature, came to be developed an elaborate science of palmistry. When systems of rules had once been established and connected with life, they continued with great obstinacy, so that the perception of failure in the validity of such expectations was met, not by discrediting the theory, but by increasing the complication of the maxims. A large mass of popular sayings relates to the determination of the weather, supposed to be predictable by means of signs often of a nature highly fantastic. Omens are derived from the actions of animals; if the winter is to be severe they lay up additional supplies or are more careful in constructing their habitations. The collection and classification of omens belonging to all countries have not yet proceeded far enough to determine how far they agree in different regions. They play an important part in the religion of the ancient Egyptians, Babylonians, Assyrians, Hindus, Chinese, Hebrews, Greeks, Romans, Arabians, and at a later period among the Celtic, Slavic, and Teutonic peoples. Nowadays they figure most prominently in Polynesia, northern Africa, southern India, and Central Asia, noticeably less so among American and Australian aborigines. Consult: Edgar Thurston, *Omens and Superstitions of Southern India* (London, 1912); C. H. Toy, *Introduction to the History of Religions* (Boston, 1913); Ludwig Dennefeld, *Babylonisch-assyrische Geburts-Omina, zugleich ein Beitrag zur Geschichte der Medizin* (Leipzig, 1914).

OMEN'TUM. See PERITONEUM.

OMER PASHA, ō′mẽr pȧ-shä′ (1806–71). A Turkish general, whose real name was Michael Latas. He was born of Christian parents at Plasky, an Austrian village in the former Croatian Military Frontier, was educated at a military school, and joined a frontier regiment. In 1828 he fled to Bosnia, turned Mohammedan, and became tutor in the household of Hussein Pasha, Governor of Widdin. In 1834 he was made writing master in a military school at Constantinople and instructor to Abd ul Medjid, heir apparent to the throne. Omer was appointed Governor of Lebanon in 1842, and successively repressed insurrections in Albania, Kurdistan, and Bosnia. In 1853 he defeated the Russians at Oltenitza, and in 1854 at Silistria, gaining possession of Bucharest. Later he repulsed the Russians at Eupatoria in the Crimea, and set out to relieve Kars, but failed. He became Governor of Bagdad in 1857, but was dismissed in 1859 on account of maladministration. In 1862 he repressed the insurrection in Montenegro and took Cetinje. In 1864 he was made field marshal and in 1867 was sent to put down the rebellion in Crete. From 1869 he was Minister of War. As a commander Omer was noted especially as a strategist.

OM MANI PADME HUM, ōm mä′nė păd′mȧ hōōm. A sacred formula in Buddhism, the so-called formula of six syllables, well known from the part which it plays in the Buddhist religion, and especially in that form of it called Lamaism. The reputed author of this formula is the Dhyana-Bodhisattva, or deified saint, Avalokiteśvara, or, as the Tibetans call him, Padmapani, the lotus-handed, or Amitabha. He is the Buddha of eternal light, the heavenly ruler of the Western paradise. Like Buddha, he is represented as sitting or standing within a lotus, and apparently there is an allusion to this in the sacred formula itself, *Om mani padme hum* (O, the Jewel in the Lotus, Amen). The sacredness of this formula is sufficient when recited to secure exemption from the cycle of reincarnation and final rebirth in the celestial paradise over which Amitabha rules. It would appear not to belong to the earliest stage of Buddhism, or to the oldest Buddhistic works of the north of India, or to those of Ceylon.

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OMMIADS, ŏm-mī′ădz, **OMAYYADS**, or **UMAYYADS**. A dynasty deriving its name from an ancestor, Omayya (Ar. *Umayya*), which succeeded to the Arabian caliphate on the death of Ali, the fourth Caliph (661), and possessed it till superseded by the Abbasides (q.v.) in 750. Moawiya (q.v.), the founder of the dynasty, was the son of the Koreish leader Abu Sofian, who defeated Mohammed at Bedr, and his mother was the notorious Hinda. After the death of Othman, the third Caliph (656), Moawiya, who was his cousin, claimed the throne, and during the whole of Ali's reign ruled over the western provinces of Syria and Egypt; but it was not till the death of that Caliph and the abdication of his son Hasan that Moawiya's authority as Caliph was recognized (661). He transferred the seat of the caliphate to Damascus, Kufa having been the residence of Ali and Medina that of the first three caliphs. The Arabs continued to extend their conquests during his reign; the Turks in Khorassan were subdued, Turkestan was invaded, and several important acquisitions were made in Asia Minor. The Caliph neglected no means of consolidating the Empire, and partly for this reason he made the succession hereditary and caused his son Yazid (680–683) to be recognized as his heir. The reigns of Yazid and his successors, Moawiya II (683) and Merwan I (683–685), are devoid of importance, as their sway extended only over Syria and Palestine. Abd al Malik (685–705), an able and warlike prince, succeeded in overcoming the rival Caliph in Medina, Abd Allah ibn Zubair (q.v.), and in rendering himself undisputed ruler of the Mohammedan world (692), but the latter part of his reign was much disturbed by rebellions in the eastern provinces. He was the first Caliph who interested himself in the promotion of liberal knowledge, causing the most celebrated poetical and other works of the Persians to be translated into Arabic. Four of his sons, Walid I (705–716), Sulaiman (716–717), Yazid II (720–724), and Hisham (724–743), successively occupied the throne. Under Walid the Ommiad caliphate reached the summit of its power and grandeur; northern Africa (709), Spain (711–714), Turkestan (707), and Galatia (710) were conquered; while towards the close of his reign his Empire was extended even to the Indus. Omar II ibn Abd al Aziz ibn Merwan (717–720), who in the justice and mildness of his government surpassed the whole of the race of Omayya, was appointed to succeed Sulaiman; but having excited discontent among his relatives by suppressing the formula of malediction against Ali and his descendants, which had hitherto been regularly pronounced at all public ceremonies, he was poisoned. The invasion of the country of the Franks and a siege of Constantinople in his reign marked the limits of the Ommiad power. Hisham, though, like his immediate predecessor, fond of pleasure, possessed all the qualities necessary for a sovereign. The Greeks, who still strove for the possession of Asia Minor, were repeatedly defeated; the Turks of northern Persia and Turkestan were kept in stern subjection, and the civil affairs of the Empire carefully and strictly administered. Nevertheless the power of the dynasty now began to decline. The march of conquest in the West was arrested by Charles Martel (q.v.) at Poitiers (732), the discontented descendants of Ali raised the standard of revolt, and Ibrahim, the fourth in direct descent from Abbas, the uncle of Mohammed, invested Abu Moslem with the arduous duty of enforcing his long-agitated claims to the throne. The reigns of Walid II (742–743), Yazid III (743–744), and Ibrahim (744), though of ephemeral duration, were long enough to produce a complete disorganization of the Empire; and though Ibrahim's successor, Merwan II (744–750), was both an able and politic ruler and a skillful warrior, the declining fortune of his family was beyond remedy. Abu Moslem, who had asserted the claims of the Abbasides amid the ruins of Merv in 747, took the field at the head of a small but zealous band and carried the black flag of the Abbasides from victory to victory, till before the close of the following year the whole of Khorassan acknowledged his authority. Irak was subdued in 749; and though Ibrahim, the Abbaside claimant, was seized by Merwan and executed in the same year, his brother, Abu 'l Abbas, succeeded to his claims, and the unfortunate Caliph, defeated in two engagements, fled to Egypt (750), whither he was pursued and slain. Abdallah, the uncle of the successful claimant, treacherously invited the remaining members of the house of Omayya to a conference and ordered a general massacre of them. Only two escaped—the one to the southeast of Arabia, where he was recognized as Caliph and where his descendants reigned till the sixteenth century; the other, Abdalrahman, to Spain, where he founded the Emirate or Kingdom (afterward Caliphate) of Cordova in 756. Consult Wellhausen, *Das arabische Reich und sein Sturz* (Berlin, 1902), and Huart, *Histoire des Arabes* (Paris, 1913).

Ommiads of Spain. ABDALRAHMAN I (756–787) accepted the Spanish throne, which was offered him by the Arab chiefs of the West. In spite of numerous revolts he strengthened and extended his power in Spain, till, with the exception of Asturias and the country north of the Ebro, his authority was everywhere acknowledged. He divided his Kingdom into six provinces, whose rulers, with the walis of the 12 principal towns, formed a sort of national diet. His successors, HISHAM I (787–796) and AL HAKIM I (796–821), were troubled with internal revolts, under cover of which the Christians established in the northwest what was known as the Spanish March. ABDALRAHMAN II (821–852) reëstablished internal quiet and occupied his subjects with incessant wars against the Christians. These conflicts developed among the Arabs that chivalrous heroism which is found nowhere else in the Mohammedan world. Abdalrahman II, himself a man of learning, greatly encouraged the arts and sciences and diffused information among his people; he also attempted, by regulating the laws of succession to property, to constitute his Kingdom on a basis similar to that of other European nations. During his reign Mohammedan Spain was the best-governed country in Europe. His successors, MOHAMMED I (852–886), MUNDHIR (886–888), and ABDALLAH (888–912), followed in his footsteps. ABDALRAHMAN III (912–961), who assumed the title of Caliph in opposition to the Abbaside caliphs of Bagdad, after suppressing some dangerous revolts which had gathered head during his minority, conquered the Kingdom of Fez from the Idrisites and brought a long and exhausting war with the powers of Asturias and León to a victorious conclusion. This period is justly termed the golden age of the Arab domination in Spain, for at no period was their power so consolidated and their prosperity so flourishing. (See CORDOVA.) Abdalrahman III, like his predecessors, was a great patron of learning and a poet of no mean ability. He founded schools which far surpassed those in other parts of Europe. His son, AL HAKIM II (961–976), was in every way worthy to be his successor. HISHAM II (976–c.1009), a child of eight years, now occupied the throne; but fortunately his mother, Sobeiha, possessed the abilities necessary for such an emergency, and appointed as her son's vizier Mohammed ibn Abdallah, surnamed Al Mansur, who had originally been a peasant. His administration was equally just and judicious and his encouragement of literature, science, and art alike liberal and discriminating. But it is as a warrior that he is chiefly remembered. The lost provinces were recovered; Castile, León, and Barcelona were conquered; and Navarre was on the point of sharing the same fate, when a rebellion in Fez compelled him to detach a portion of his forces for service in Africa, and the combined armies of the four Christian monarchies, seizing this opportunity, inflicted upon the Arabs a sanguinary defeat in 1001. Mohammed's spirit was completely broken by this blow and he died a few days afterward. With him the star of the house of Omayya set forever. The rest of Hisham's reign was a scene of disorder and civil war. Pretenders to the caliphate arose, while the walis of the various provinces set up as independent rulers and the invasions of the Christians added to the confusion. With the expiration of the brief reign of HISHAM III (1027–31) the family of Omayya disappears from history. The three centuries of Ommiad rule in Spain is the period which gives lustre to the name. Consult: Louis Viardot, *Histoire des Arabes et des Maures d'Espagne* (Paris, 1851); R. P. A. Dozy, *Histoire des Musulmans d'Espagne* (Leyden, 1861); August Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1887); C. I. Huart, *Histoire des Arabes* (Paris, 1913); Becker, "Expansion of the Saracens," in *Cambridge Mediæval History*, vol. ii (Cambridge, 1913). See references under MOORS.

OM'NIBUS. See CARRIAGE.

OMNIBUS BILL. A term frequently applied to single legislative acts in which are incorporated a number of loosely related or wholly disconnected measures. The term probably first applied to a bill proposed in Congress in 1850 for the admission of California to the Union with a constitution prohibiting slavery; for the organization of New Mexico and Utah without reference to slavery; for the abolition of the slave trade in the District of Columbia; for the payment of $10,000,000 to Texas for her claim to a part of New Mexico; and for the more efficient rendition of fugitive slaves. (See COMPROMISE MEASURES OF 1850.) As each of these matters was finally covered by a separate bill, it is incorrect to speak of the compromise measures of 1850 as the Omnibus Bill, as is frequently done. Omnibus bills were formerly passed with some frequency by State legislatures, but provisions have found their way into a number of constitutions requiring that single statutes shall deal with but one main subject, which shall be clearly indicated in the title.

O'MORE, ō-mōr', ROGER, or RORY (?–1652). An Irish patriot. He was the principal conspirator with Sir Phelim O'Neill in the attempted seizure of Dublin Castle in 1641, and as colonel of Ulster troops won a victory at Julianstown, Meath. He fought under Owen Roe and with Antrim in 1644, but after the failure of the 1650 uprising, in which he was engaged, he disappeared and is supposed to have died miserably.

O'MORE, RORY, or RURY OGE (?–1578). An Irish patriot, second son and namesake of a captain of Leix. He entered young into the national conflict and was pardoned in 1565–66. He was imprisoned for his share in the Kildare plots of 1574. He escaped and was pardoned again in 1576, but the hope of help from Spain made him rebel once more. After several escapes he was caught and killed by the Fitzpatricks and his head was set up on Dublin Castle.

OMPHALE, ŏm'fȧ-lē. The Lydian queen whom Hercules served. See HERCULES.

OMPHALOPHLEBITIS, ŏm′fȧ-lō-flė-bī′tĭs. See Joint Ill.

OMPHALOPSYCHITES, ŏm′fȧ-lŏp′sī-kīts. See Hesychasts.

OM′PHALUS (Lat., from Gk. ὀμφαλός, *omphalos*, navel, the centre point). The name of a stone in the temple of Apollo at Delphi, supposed to mark the centre of the earth. According to the legend Zeus loosed two eagles, one at the east and one at the west, and in their flight they met at this point. In works of art the stone is conical and covered with a network of fillets or ribbons, while often on either side are perched the eagles. In the time of Pausanias the Omphalus stood outside the temple. The origin of the Omphalus is not clear. Conical stones were elsewhere worshiped, but there is much in the Delphic legend which suggests that the Omphalus marked a grave and was connected with an early chthonic cult.

OMRI, ŏm′rī (c.903–872 B.C.). According to 1 Kings xvi. 15–28, he was captain of the host besieging Gibbethon, a Philistine town, when Elah was murdered by Zimri. Proclaimed King by the army, he marched to Tirzah and inclosed it. After Zimri's self-inflicted death, Tibni ben Ginath and his brother Joram were still in arms against Omri, but he made himself master of Israel. He showed his wisdom by selecting Samaria (q.v.) as his capital, and by dividing the land into government districts, crossing the tribal boundaries. He had to concede certain privileges to the Aramæans of Damascus in his capital (1 Kings xx. 34), and was forced to surrender several towns to Bar Hadad I (q.v.). Yet he was a powerful ruler, as the Mesha inscription indicates (see Moabite Stone), which records his capture of Medabah from Moab and his oppression of this people. In the Assyrian inscriptions Israel is often designated as *mat bit Ḫumri*, 'the land of the house of Omri,' or simply *mat Humri*, 'the land of Omri.' He is the first King of Israel mentioned in contemporaneous foreign sources. The excavations undertaken by Harvard University in 1908–09 have laid bare the walls of the palace built by Omri. Consult the histories of Israel by Stade (1887), Guthe (1899), Kittel (2d ed., 1909–12), Wellhausen (7th ed., 1914), and the works quoted under the article Samaria.

OMSK, ŏmsk. The capital of the Territory of Akmolinsk and of the Governor-Generalship of the Steppes, Russian Asia, the latter since 1882. It is situated just above the confluence of the Om with the Irtysh, on a barren steppe, 1624 miles by rail east of Moscow (Map: Asia, J 3). Its average annual temperature is somewhat over 33° F. It is poorly built. It has two Gymnasia, a seminary for teachers, a technical school, and the West Siberian section of the Imperial Russian Geographical Society. It also boasts of a museum in which collections illustrating the natural history of the steppes are gathered. Its industries are unimportant. Its commerce has developed since the construction of the Trans-Siberian Railway, Omsk having become a distributing station for Western Siberia. Dostoyevsky was imprisoned in the old fortress of this city from 1849 to 1853. Pop., 1911, 129,422.

OMUL, ō-mụl′. A small salmon (*Salmo migratorius*) which abounds in Lake Baikal and other waters of eastern Siberia, whence great quantities are sent salted to all of the western parts of the country.

ON. An ancient Egyptian city. See Heliopolis.

ONA, ō′nȧ. A group of tribes, apparently constituting a distinct linguistic stock, inhabiting the shores and islands of the Strait of Magellan and the northwestern part of Tierra del Fuego. In spite of the cold and desolate nature of the country, they go almost naked and build only slight brushwood shelters, protecting their bodies by copious rubbing of grease. They are tall and strongly built and are expert hunters and fishers, using the club, sling, bow, bolas, and lance. Their bark canoes withstand almost any storm, and the baskets woven by the women are so well made that they will hold water. They have also trained dogs to hunt. Little is yet known of their religion or sociology, which, however, appear to be as elaborate as among most roving tribes. They formerly numbered nearly 3000, but are being exterminated by the sheep herders who have occupied the country. Consult: Hyades, in *Revue d'Ethnographie*, vol. iv (Paris, 1885), and "L'Ethnographie des Fuégiens," in L. F. Martial, *Mission scientifique du Cap-Horn*, vol. i (ib., 1888).

ONARR. See Annarr.

ONA′TAS (Lat., from Gk. 'Ονάτας) (fl. 490–460 B.C.). A Greek artist, a native of Ægina and son of Micon. Among his famous works were a four-horse chariot at Olympia, made for Hiero of Syracuse to commemorate a victory in the games, a colossal Hercules at the same place, dedicated by the Thasians, and a group of the Greek heroes casting lots to determine who should accept the challenge of Hector. At Delphi was a large group of fighting men dedicated by the Tarentines. Onatas is known only as a worker in bronze, but it is probable that the Æginetan sculptures (q.v.), in the pedimental figures, show his influence on the art of his native island.

OÑATE, ō-nyä′tȧ, Juan de (c.1555–c.1615). A Spanish explorer, settler of New Mexico. He was born at Guadalajara, Mexico, of which city his father was the founder, and married a granddaughter of Cortés. In 1595 he received permission from the Viceroy, Luís de Velasco, to colonize what is now New Mexico. After his preparations were complete the start was delayed by the new Viceroy, Conde de Monterey, who proceeded to investigate the fitness of Oñate for the expedition. In the latter part of January, 1598, Oñate set out from Zacatecas with 400 men (130 having families), many Indians, and a large supply of live stock. He crossed the Rio Grande in April and in August founded San Juan, which became his headquarters. He led an expedition to Guivira (probably in southern Kansas) in 1601 and one to Arizona in 1604. It appears that he was relieved of the governorship of New Mexico in 1608. The principal source for the history of the expedition is an epic poem by Gaspar de Villagrá, a captain, who accompanied Oñate and made him the hero of the epopee.

ONAWA, ŏn′ȧ-wȧ. A town and the county seat of Monona Co., Iowa, 60 miles by rail north of Council Bluffs, on the Illinois Central and the Chicago and Northwestern railroads (Map: Iowa, A 2). It is the commercial centre of a productive farming and stock-raising country. There is a public library. The electric-light plant is owned by the city. Pop., 1900, 1933; 1910, 2026.

ONAWAY, ŏn′ȧ-wā. A city in Presque Isle Co., Mich., 45 miles northwest of Alpena, on the Detroit and Mackinac Railroad (Map: Michigan, E 3). It is situated in a fine fruit and live-stock region and has a large bicycle-rim factory and saw and shingle mills. There are municipally owned water works. Pop., 1900, 2014; 1910, 2702.

ONCKEN, ŏṇk′en, AUGUST (1844–1911). A German economist of the Historical school. He was born at Heidelberg, studied there, at Munich, and at Berlin, and in 1877 became professor of political economy and statistics in the Imperial Agricultural Institute in Vienna, where he had been a lecturer since 1872. In 1877 he was called to the Polytechnic Institute at Aix-la-Chapelle and in 1878 to the University of Bern. Among his works are: *Adam Smith in der Kulturgeschichte* (1874); *Adam Smith und Immanuel Kant* (1877); *Die Maxime "Laissez faire et laissez passer"* (1886); a valuable critical edition of Quesnay (1888), which gave fresh stimulus to the study of the physiocrats; *Geschichte der politischen Oekonomie*, part i (1901); the biography of Lassalle (1904); and contributions to *Berner Beiträge zur Geschichte der Nationalökonomie*, of which he was editor.

ONCKEN, HERMANN (1869–). A German historian. He was born in Oldenburg and was educated at the Gymnasium there and at the University of Berlin, where he became privatdocent in 1898. In 1904 he was appointed instructor at the Royal Military Academy, in 1905–06 taught at the University of Chicago, and in 1907, after a year at Giessen, was chosen to succeed Marcks as professor of modern history at Heidelberg. Oncken wrote on the history of Oldenburg, the standard biography of Ferdinand Lassalle (1904), a valuable work on Rudolf von Bennigsen (2 vols., 1910), *Amerika und die grossen Mächte* (1910), *Historisch-politische Aufsätze und Reden* (1914), *Deutschlands Weltkrieg und die Deutschamerikaner* (1914).

ONCKEN, WILLIAM (1838–1905). A German historian, brother of August Oncken. He was born in Heidelberg, was educated there and at Göttingen and Berlin, lectured at Heidelberg (1862–70), and in 1870 was appointed professor of history at Giessen. In 1877 he became editor of the comprehensive series entitled "Allgemeine Geschichte in Einzeldarstellungen," in 44 volumes. He wrote: *Athen und Hellas* (1865–66); *Stadt, Schloss und Hochschule Heidelberg* (3d ed., 1885); and in the series mentioned above: *Das Zeitalter Friedrichs des Grossen* (1881–83); *Das Zeitalter der Revolution, des Kaiserreichs und der Befreiungskriege* (1885–87); *Das Zeitalter des Kaisers Wilhelm I.* (1890–92).

ON′COCAR′PUS (Neo-Lat., from Gk. ὄγκος, *onkos*, hook, + καρπός, *karpos*, fruit). A genus of trees of the family Anacardiaceæ. *Oncocarpus vitiensis*, a remarkable Fiji Island tree about 60 feet high, has large oblong leaves and a corky fruit somewhat resembling the seed of a walnut. Its sap when brought in contact with the skin is very caustic, for which reason the wood is called itch wood. The exudations are said to cause itching with irritation for several days.

ON′CORHYN′CHUS (Neo-Lat., from Gk. ὄγκος, *onkos*, hook + ῥύγχος, *rhynchos*, snout). A genus of salmon including those of the Pacific coast, several species of which are of commercial importance. See SALMON, and Plate of SALMON AND TROUT.

ONDRICZEK, ŏn′drĕ-chĕk, FRANZ (1859–). A Bohemian violinist, born at Prague. He received his first instruction from his father, attended the Prague Conservatorium in 1873–76, and studied under Massart at the Paris Conservatoire, where he won the first prize at the end of two years. Subsequently he played as a soloist on concert tours in France, Russia, Germany, Holland, Great Britain, Italy, America, and in the Far East. In 1908, with Silbiger, Junck, and Jelinek, he formed in Vienna a quartet which soon acquired a European reputation. He wrote *Neue Methode zur Erlernung der Meistertechnik des Violinspiels auf anatomisch-physiologischer Grundlage*.

ONEGA, ō-nyĕ′gȧ, LAKE. A lake in the northern part of Russia, Government of Olonetz (Map: Russia, E 2). Next to Ladoga (q.v.) the largest lake in Europe, measuring 150 miles in length by 50 miles in greatest width, with an area of 3700 square miles, it extends from the northwest to the southeast, parallel with the line of glacial movement in the locality, and to the scouring action of the ice it owes its origin. Its greatest depth does not exceed 500 feet. The north shore is indented with numerous deep and narrow fiords, and the lake contains a large number of islands, some of which are inhabited by fishermen and lumbermen. Lake Onega receives the waters of a number of other lakes to the north and east of it, its own waters flowing into Lake Ladoga through the Svir. A canal runs along the south shore of the lake, from the Svir on the west to the Vytegra on the east, the latter river being further connected by canals with the Volga and the Dvina. The lake is ice-free for 200 days of the year, May to December. The low-water season is in March and the lake rises rapidly until June.

ONEGLIA, ō-nā′lyȧ. A town in the Province of Porto Maurizio, Italy, 40 miles east-northeast of Nice, on the Gulf of Genoa, at the mouth of the Impero, here crossed by two iron bridges (Map: Italy, A 3). The town has a prison resembling a church. It is a garrison town and a sea-bathing resort, has a harbor, and carries on trade in wine, oil, and fruits. Andrea Doria, the Genoese admiral, was born here. Pop. (commune), 1901, 8527; 1911, 9955.

ONE-HOSS SHAY, THE WONDERFUL. A familiar humorous poem by Oliver Wendell Holmes (1858), published under the title of "The Deacon's Masterpiece."

ONEIDA, ō-nī′dȧ. A central tribe of the Iroquois (q.v.) confederacy. The name by which they are commonly known is a corruption of their proper name, *Oneyotka-ono*, commonly rendered "people of the stone," referring to the tribal palladium, the celebrated Oneida Stone, a large granite bowlder near the site of their ancient village on Oneida Lake. Their territory was about the lake of the same name, in central New York and extending southward to the waters of the Susquehanna. They were considered a younger member of the confederacy, and never attained any special prominence in its affairs, seeming always to have acted contrary to the spirit of the league, being usually friendly to the French and Jesuits, of whom the majority of the Iroquois were the determined enemies; at a later period they, almost alone of their kindred, took sides with the Americans in the Revolutionary War. Their friendship for the Americans during this struggle was due chiefly to the influence of their Congregational missionary, Samuel Kirkland, and drew down upon them the vengeance of the hostile Iroquois under Brant, who burned their villages and forced them to take refuge within the American settlements until the close of the war, when the main body returned to their former homes, while a considerable number emigrated to Canada and settled upon Thames River, Ontario, where they still remain. Between 1820 and 1835, having sold most of their lands in the State of New York, the majority of the Oneida removed to a reservation at the head of Green Bay, Wisconsin, where they now reside, being fairly prosperous and civilized, as are also those in New York and Canada. See Iroquois.

ONEIDA. A city in Madison Co., N. Y., 26 miles east of Syracuse, on the New York Central and the New York, Ontario, and Western railroads (Map: New York, E 4). It has a fine high-school building, an old ladies home, a public library, two hospitals, and Allen and Higenbotham parks. It is but 5 miles distant from Oneida Lake, on the east end of which is Sylvan Beach, a popular watering place. The industrial interests are represented by ironworks, canneries, and manufactories of caskets, flour, hosiery, handcarts, carriages, wagons, furniture, steel and wood pulleys, silverware, and cigars. The surrounding country is agriculturally productive. Under a charter of 1901 the government is administered by a mayor and common council, biennially elected. The water works are owned and operated by the municipality. Pop., 1900, 7538; 1910, 8317; 1915 (State census), 9472. The first settlers in the present limits of Oneida came in 1834, but a village was not established until 1839 and was not incorporated until 1848. The city was chartered in 1901. Oneida Castle, the ancient seat of the famous Oneida Indians, is not far distant, and 2 miles to the south is the Oneida Community (q.v.). Consult Durant, *History of Oneida County, N. Y.* (Philadelphia, 1878).

ONEIDA COMMUNITY. A communistic settlement at Oneida, Madison Co., N. Y., founded in 1847 by John Humphrey Noyes (q.v.). It had a religious origin, Noyes having been led by his New Testament studies to believe in the possibility of Christians living a sinless life and in other doctrines at variance with those of the established churches. In 1838 a small settlement of his disciples was formed in Putney, Vt., the home of his father's family, where it existed till its removal in 1847–48 to Oneida, N. Y. For the first 10 years the Oneida Community was not financially successful, but after 1857 was prosperous, largely through the manufacture of the Oneida trap. There was no formally chosen leader, as it was believed that the most fit would naturally control, and Noyes remained the leading spirit. The distinguishing feature of the social life was the system of complex marriage. Marriage was not permanent, but license did not prevail, as the marital relations were carefully regulated and the Community assumed responsibility for the support and education of the children. A novel feature of the life was the plan of mutual criticism, which is said to have successfully taken the place of ordinary means of government in the society. Outside opposition to this system, especially on the part of the churches, led to its abandonment in 1879, and the voluntary dissolution of the Community and reorganization into a joint-stock company took place on Jan. 1, 1881; but while communism of property and the distinctive social life were given up, a common dining room, laundry, library, and assembly hall and other coöperative features are still retained. At the time of the dissolution of the Community it had about 238 members, with 45 others at a branch at Wallingford, Conn., owned 650 acres of land, with numerous manufacturing establishments and other buildings, the total property being valued at $600,000. It has since largely increased its property and business, having manufactories at Kenwood, Sherrill, and Niagara Falls, N. Y., and Niagara Falls, Ontario. Consult: J. H. Noyes, *The Berean* (Putney, 1847); id., *History of American Socialisms* (Philadelphia, 1870); Charles Nordhoff, *Communistic Societies of the United States* (New York, 1875); W. A. Hinds, *American Communities and Coöperative Colonies* (2d ed., Chicago, 1908). See Communism.

ONEIDA LAKE. A body of water in central New York. Its western end lies about 11 miles north of Syracuse (Map: New York, E 4). The lake extends from Oneida County into Oswego County and is roughly oblong in shape, about 25 miles long and 5 miles in maximum breadth. Its outlet (at its west end) is the Oneida River, a tributary of the Oswego, which flows into Lake Ontario.

O'NEILL, ō-nēl′, Eliza, later Lady Becher (1791–1872). An Irish tragedienne, daughter of an actor who managed the Drogheda Theatre. After playing for some years in Ireland she went to London, where on Oct. 6, 1814, she appeared as Juliet at Covent Garden. Her success was immediate and for five years she was the most popular actress in Great Britain. Then she married William Wrixon Becher, one of the Irish members of Parliament, who afterward succeeded to a baronetcy. After her marriage she never again appeared on the stage.

O'NEILL, Hugh, second Earl of Tyrone. See Tyrone.

O'NEILL, Moira. See Skrine, Nesta Higginson.

O'NEILL, Nance (Gertrude Lamson) (1874–). An American actress, born at Oakland, Cal. She first appeared on the stage at San Francisco, and then played at Los Angeles and Denver. In 1899 she made her début on the London stage as Leah in *The Jewess*, and in the following year started on a world tour. Subsequently she starred in many cities of the United States in such plays as *Magda, Hedda Gabler, Macbeth, The Jewess, The Sorceress, Monna Vanna, Agnes* (1908), and *The Lily* (1909 and 1913). She played a stock season at Boston in 1912 and acted in New York in 1913.

O'NEILL, Owen Roe (Gael. *Eoghan Ruadh*, Red Owen) (?–1649). The commander of the Irish forces in the wars against the English in the first half of the seventeenth century. He was the nephew of Hugh O'Neill, Lord of Tyrone, and on the flight of the northern chiefs in 1607 he accompanied his uncle to the Continent, where he was carefully educated at Louvain. Like most of the exiles of that period, he selected the profession of arms and rose to distinction as commander of the Irish troops in the service of Spain. In the meantime the wholesale confiscations in the north of Ireland, known in history as the Plantation of Ulster, led to a general rising of the Irish in 1641. On the invitation of a delegation sent for that purpose, O'Neill crossed over to Ireland, assumed command of the forces levied by the General Assembly of the Irish nation, and for eight years held in check the whole power of England and the Scottish planters. His most signal victory was won at Benburb on the Blackwater, in Tyrone, June 5, 1646, when with 5500 men he routed Monroe's army of 7000, killing, disabling, or taking nearly one-half the enemy, and capturing all the artillery, baggage, and 1500 horses, after which, rapidly facing around, he put to flight two other detachments of 2500 troops which were marching to effect a junction with Monroe. For two years more he continued to win one victory after another, in nearly every instance against superior force or equipment, until his death, Nov. 6, 1649, after a brief illness. His removal deprived the Irish army of competent leadership, and the execution of King Charles I and the overthrow of the Royalist party in England left the way clear for the invasion by Cromwell in the same year. Consult E. A. D'Alton, *History of Ireland*, vol. ii (London, 1906).

O'NEILL, Peggy. See Eaton, Margaret (O'Neill).

O'NEILL, Sir Phelim (c.1604–53). An Irish rebel, the eldest son of Turlough O'Neill. As a youth he studied law at Lincoln's Inn, but lived a lawless life on his return to his native land, where he became an active participator in the insurrection of 1641. He was one of the five who planned to surprise Dublin Castle, and through a treacherous breach of hospitality he obtained possession of Charlemont Castle, while as the result of further successes he was made commander in chief of the northern Irish forces. He represented Ulster in the Confederate Council of 1642, but his failure to capture Drogheda after a prolonged siege in 1641–42 lessened the confidence of his army, which had once numbered 30,000, and he yielded the chief command to Owen Roe ONeill (q.v.). Sir Phelim then expected to regain it, but was disappointed, and he went into hiding after the surrender of Charlemont in 1650, but was caught at last, tried, and executed for the atrocious massacres which he had ordered. O'Neill refused to save himself by giving any evidence to show that Charles I had authorized him to raise troops in Ireland.

O'NEILL, Sir Turlough Luineach (c.1530–95). An Irish chieftain, Lord of Tyrone in the County of Ulster, where he was born. He was a cousin of the notorious Shane O'Neill, whom he tried unsuccessfully to oust from the headship of the clan during the latter's compulsory absence in England in 1562. Turlough succeeded Shane at his death five years afterward. Though Turlough promised fidelity to Queen Elizabeth, he excelled even his predecessor in the formation of traitorous leagues with the Scots. An unsuccessful attempt was made to capture him in 1568, and his country was invaded by Essex, the English Governor of Ulster, in 1574. Turlough was called upon to surrender his lands, merely that he might receive them again under an English tenure. He took up arms against the English in 1579, and four years later was beaten back by O'Donnell, and he next entered into strife for the possession of lands with the Earl of Tyrone, over whom he gained a victory in 1588, but he resigned in the latter's favor five years afterward. While Turlough was making a final effort to regain his lost sovereignty, his castle was destroyed by Tyrone and he was obliged to hide in a ruin near by, where he died.

ONEIROMANCY, o-nī′rô-măn′sĭ. See Divination.

ONEONTA, ŏ′nė-ŏn′tȧ. A city in Otsego Co., N. Y., 61 miles northeast of Binghamton, on the Susquehanna River and on the Delaware and Hudson, the Ulster and Delaware, and the Otsego and Herkimer railroads (Map: New York, F 6). It is the seat of the Oneonta State Normal School and has a public library, a State armory, two parks, fine high-school, municipal, and Federal buildings, and the Aurelia Fox Memorial Hospital. The city carries on considerable trade and its industrial establishments include construction and repair shops of the Delaware and Hudson Railroad, a silk mill, planing mills, a glove factory, foundries, and manufactories of cigars, toys, overalls, and milk products. Settled about 1800, Oneonta was incorporated as a village in 1848 and as a city in 1908. The government is vested in a mayor, six aldermen, elected biennially, and appointive boards of public works and health and fire, police and park commissions. Pop., 1900, 7147; 1910, 9491; 1914 (U. S. est.), 10,488.

ON′ESAN′DER (Lat., from Gk. *'Ονήσανδρος, Onēsandros*). A Platonic philosopher of the first century A.D. He lived at Rome under Nero and wrote a tract, *Στρατηγικὸς Λόγος*, dedicated to Q. Veranius Nepos, consul in 49. The work deals with the ethical duties of a general, is based on Xenophon, and was first edited in Greek in 1599. Later editions are by Koraïs (Paris, 1822) and Köchly (Leipzig, 1860). The work was much used by modern writers on military matters.

ONE-TO-ONE CORRESPONDENCE. See Correspondence.

ONI′AS′ TEMPLE. A sanctuary built at Leontopolis in Egypt by the Jewish high priest Onias, probably not long after the desecration of the temple at Jerusalem by Antiochus IV Epiphanes in December, 168 B.C. According to Josephus this Leontopolis was situated in the Heliopolitan nome (*Ant.*, xiii, 3, 2), 180 stadia northeast of Memphis (*Bel. Jud.*, vii, 10, 3), and is not to be confused with the well-known Leontopolis in the Delta. It consequently cannot have been far from the city of Heliopolis itself. In the *Itinerarium Antonini* a *Vicus Judæorum* is mentioned that may have belonged to the Nome of Heliopolis but is 464 stadia from Memphis. At this place, the modern Belbeis, there once was a temple of the goddess Bast, and in the neighborhood there is a Tell el Yehudiyyeh. Another Tell el Yehudiyyeh, however, with a Jewish cemetery, is found near Heliopolis. This has been identified by Naville as the capital of "the land of Onias," and it is probably identical also with the *Castra Judæorum* mentioned in a *Notitia Dignitatum Orientis*, c.25 A.D., while the so-called Camp of the Jews (*Ant.*, xiv, 8, 2) was in another direction, northwest of Memphis. A temple of Bast is perhaps more likely to have been allowed to fall into ruins there than nearer to Bubastis. There is no reason for doubting that an old pagan temple was given to Onias and remodeled by him. The tower-like shape indicates this. If it had been a new structure the pattern of the temple in Jerusalem would no doubt have been followed in regard to the exterior as well as the interior.

As to the identity of the Jewish high priest there is still some uncertainty. In his *Jewish War*, written a few years after the fall of Jerusalem, Josephus states that Onias, son of Simon, fled from Antiochus IV Epiphanes to Egypt and built the temple of Leontopolis (i, 1, 1; vii, 10, 2–4). He would consequently be Onias III, son of Simon the Just. With this agree Theodore of Mopsuestia in his commentary on Psalm lv, the references in the Palestinian Talmud (Yoma vi, 3), and the Babylonian Talmud (Menachoth 109 a). On the other hand, Josephus declares in his *Antiquities* (xii, 5, 1; xii, 9, 7; xiii, 3, 1–3; xiii, 10, 4; xx, 10) that the builder was a son of Onias III, who fled to Egypt in the time of Antiochus V Eupator (164–162 B.C.), when Menelaus was deposed and Alcimus took his place. As the *Antiquities* were written c.95 A.D. and therefore may be thought to represent more careful research, and it is told in 2 Macc. iv, 33 et seq. how Onias III was murdered by Andronicus in a sanctuary at Daphnæ, near Antioch, and bitterly lamented by Antiochus IV, many scholars have credited the later account rather than the earlier. But neither Josephus himself nor Theodore, who elsewhere follows 2 Maccabees, mentions any such murder of Onias, and Baethgen, Willrich, and Wellhausen have strongly argued that the notice is unhistorical, being either a confusion with the murder of Menelaus or a transference to the Jewish high priest of the tragic fate of a son of Seleucus murdered by Andronicus at Daphnæ and naturally mourned by Antiochus. Josephus may, in his old age, have been misled by a poorer source or an altered tradition, a change of attitude towards the temple at Leontopolis being clearly discernible on the part of the Jewish teachers.

If it was Onias III who in 170 B.C. fled to Egypt, it is natural to suppose that the desecration of the temple in Jerusalem and its dedication to Zeus Olympius in 168 B.C. led him to ask Ptolemy VII Philometor and Cleopatra I for the temple of Bast at Leontopolis. For three years the legitimate high priest and ethnarch would then have officiated in a temple dedicated to the worship of Yahwe before the restoration of the Yahwe cult in Jerusalem in December, 165 B.C. It has been supposed that Isa. xix. 18–25 was written in 150 B.C., when Jonathan sat by the side of Alexander Balas, as he was married to Cleopatra. Here reference is made to five cities in Egypt occupied by Hebrews and speaking "the language of Canaan," one of them called Leontopolis (the city of the Lion), or possibly Heliopolis (the city of the Sun), and to an altar and sacred stone at the border of Egypt, where the Egyptians are expected to offer sacrifices to Yahwe. But the discovery of the Elephantine papyri (q.v.) renders it probable that there were Jewish military colonies in several Egyptian cities even before the Exile. The feeling of the Greek translator towards Leontopolis is seen in his rendering the name "the city of righteousness." It has been supposed that the *Sibylline Oracles* (v, 492 et seq.) refer to this temple, but that is probably wrong. Early regulations preserved in the Mishna (Menachoth xiii, 10) provide that a sacrifice promised to this temple should be offered there and that priests of the temple should not lose their priestly dignity or share of the offerings if they came to Jerusalem. It is only after the destruction of the temple, and especially by rabbis of the second and third centuries, that the cult there was condemned (Menachoth 109 b). After the fall of Jerusalem in 70 A.D. it seems to have enjoyed such favor that the Romans had reason to fear it, and after 72 A.D. Lupus closed it, and some time later, possibly 75 A.D., Paulinus destroyed it (*Bel. Jud.*, vii, 10, 2–4). Josephus states that it had then stood 343 years. This is no doubt an error for 243, which would place its consecration as a Yahwe sanctuary in 168 B.C.

Bibliography. Cassel, *De Templo Oniæ Heliopolitano* (Bremen, 1730); L. Herzfeld, *Geschichte des Volkes Israel*, vol. ii (Leipzig, 1863); Heinrich Ewald, *Geschichte des Volkes Israel*, vol. iii (3d ed., Göttingen, 1866); Joseph Derenbourg, *Essai sur l'histoire et la géographie de la Palestine* (Paris, 1867); H. Graetz, *Geschichte der Juden* (4th ed., Leipzig, 1888); Edouard Naville, in Egypt Exploration Fund, *Seventh Memoir* (London, 1888); Hugo Willrich, *Juden und Griechen vor der makkabäischen Erhebung* (Göttingen, 1895); Alfred Bertholet, *Die Stellung der Israeliten und der Juden zu den Fremden* (Freiburg, 1896); Adolf Büchler, *Die Tobiaden und die Oniaden* (Vienna, 1899); Hugo Willrich, *Judaica* (Göttingen, 1900); Theodore Reinach, "Antiquités judaïques," in his French translation of Josephus, vol. iii (Paris, 1904); W. M. Flinders Petrie, "Hyksos and Israelite Cities," in *Egyptian Research Account*, vol. xii (London, 1906); J. G. Duncan, *Exploration of Egypt and the Old Testament* (New York, 1909); Emil Schürer, *Geschichte des jüdischen Volkes*, vol. iii (4th ed., Leipzig, 1909; Eng. trans. of 2d ed., New York, 1896); Julius Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

ONION, ŭn′yŭn (Fr. *oignon*, *ognin*, from Lat. *unio*, pearl, onion). Certain species of the genus *Allium* (q.v.), particularly *Allium cepa*, a biennial bulbous-rooted vegetable with a swelling stem, leafy at the base and with tapering fistular leaves. The bulb is composed of thickened leaf elements in concentric layers. The native country of the onion is not certainly known, but is probably either India or Egypt, in both of which countries it has been cultivated from the most remote antiquity. The part chiefly used is the bulb, but the young leaves are also employed and young seedlings drawn from onion beds are a very common ingredient in soups and sauces in the beginning of summer.

The onion requires a light, friable, well-drained soil, well stocked with organic matter and liberally fertilized. Reclaimed marsh soils are successfully and extensively used for growing the crop. Onions are propagated from: (1) sets, i.e., little bulbs which form on the tops of the stems of some varieties in place of seed, or by division of the parent bulb as in the case of the potato onion, or from small onions obtained from thickly sown seed; and (2) from seed. The first method is the one generally employed by farmers and market gardeners in growing early bunching onions. The sets are planted either in the fall or spring in rows 1 foot apart and 3 inches distant in the row. The main crop of onions is usually grown from seed sown in the open field in rows 12 to 14 inches distant and thinned to 3 inches in the row. Sometimes the seed is sown in the fall and transplanted to the field in the spring, but the method coming into vogue now in the United States is to sow the seed under glass in the early spring and transfer to the field as soon as the weather will permit. Besides the certainty of an even stand by this method, the yields are much higher, the bulbs grade more uniformly, and the extra cost of transplanting is not much more than the cost of thinning and weeding when the seed is sown in place. Thorough cultivation is essential by whatever method grown. The bulbs are harvested when the most of the necks turn yellow, and are cured in rows if the weather is not too hot, or in open sheds or barns in rainy weather. They may be kept over winter by freezing and keeping in that state until spring or by storing in a dry apartment and keeping the temperature just above freezing. American varieties keep longer and are better adapted to most parts of the United States, but foreign varieties are better flavored and bring a higher price in the market. Bermuda onions, Spanish onions, and some other foreign varieties are quite extensively grown in California and the Southern States, particularly Texas. The commercial onion crop of the United States amounts to over 6,000,000 bushels annually.

The potato onion, also called the Egyptian or ground onion, is a perennial variety which produces offset bulbs resembling the shallot but larger. They are milder than garlic, but are stronger than the common onion. The tree onion produces bulbs at the top of the stem, the umbels becoming viviparous. The Welsh onion (*Allium fistulosum*), also called cibol, is little cultivated in America. Its leaves are used like those of the shallot, by which name it is also known. Onions are similar to but milder than garlic (q.v.).

ONION FISH. See Grenadier.

ONION INSECTS. The principal insects which damage the onion crop are the onion maggot (larva of *Phorbia ceparum*), the onion thrips (*Thrips tritici*), and the onion cutworm (larva of *Agrotis messoria*). The adult of the onion maggot is a fly of the family Anthomyiidæ. The eggs are laid early in the spring, next to the stems or leaves at the surface of the ground, and preferably in young onion beds. The larvæ work their way into the bulb and cause the rapid decay and death of the plant. Inasmuch as the bulb is the edible part of the vegetable, the slightest damage by these maggots is fatal, since the decay continues even after the maggots are killed. The maggots reach full growth about the end of May, and about the middle of June the second generation of flies occurs. This generation often attacks seedling onions, ruining entire beds. The insect passes the winter partly in the pupa state in the ground and partly as adult in sheltered locations. On a small scale damage may be prevented by the use of sand soaked in kerosene, mixed with drier sand and placed at the base of the onion plants along the rows. This prevents egg laying and kills such of the young maggots as attempt to work through it. On a large scale, the first plants which wilt must be lifted out and destroyed, and then kainit and nitrate of soda must be applied broadcast to the roots.

The onion thrips sometimes attacks onions in great numbers, puncturing the succulent leaves and leaving a small yellow dot after each puncture. The leaf gradually loses its vitality and the top turns yellow. This thrips is not confined to the onion, but is also found upon cabbages and the flowers of the orange farther south, and upon grass, wheat, oats, and rye. It thrives best in hot, dry weather, and the best remedy is a free use of standard kerosene emulsion diluted to one-tenth the original strength.

Several species of cutworms attack onions, but *Agrotis messoria* has been specifically injurious in some of the large fields in the northeastern States. The remedy here, as for other cutworms, consists in trapping the over-wintering larvæ early in the spring before vegetable gardens are set out, by distributing about the field bunches of grass or other early vegetation poisoned with Paris green or arsenic. Consult J. B. Smith, *Economic Entomology* (Philadelphia, 1896).

ONION RIVER. See Winooski.

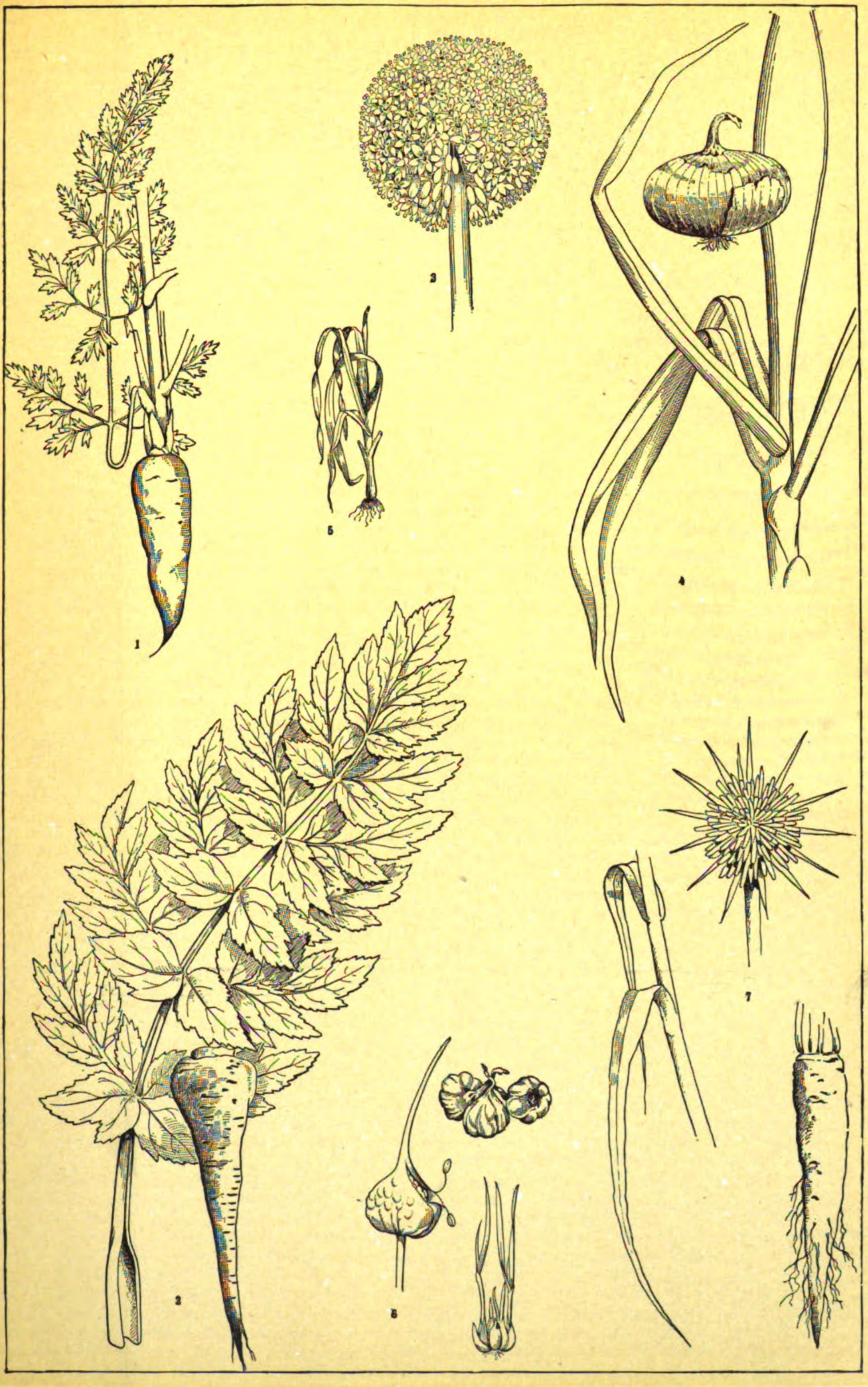
ONIONS, Oliver (c.1876–). An English novelist. He was apprenticed to a firm of designers in the Midlands, studied for three years at the National Art Training School (now the Royal School of Art), South Kensington, and lived for a time in Paris, where he wrote for the students' periodical, *Le Quartier Latin*. In London he designed posters, did advertising drawings, and was war artist for a weekly. His *Appreciation of the Work of Henry Ospovat* (1910) is an example of his direct criticism of art. Onions's fiction ranks with the best and the most successful of the younger English school. Among his better-known novels are: *Little Devil Doubt* (1909), a story of newspaper life; the trilogy, *In Accordance with the Evidence* (1912), *The Debit Account* (1913), and *The Story of Louie* (1913); *The Exception* (1910); *Gray Youth* (1914; published first as two separate volumes, *The Two Kisses*, and *A Crooked Mile*), describing studios and art students; *Mushroom Town* (1915). His wife, Berta Ruck, published in 1915 a novel, *The Courtship of Rosamund Fayre*.

ON′KELOS. The supposed author of an Aramaic version of the Pentateuch. Onkelos is evidently, however, the Aramaic equivalent of Aquilas (or Aquila, q.v.), the Greek translator of the Pentateuch, and the term Targum Onkelos indicates merely that the translation is done in the style of Aquilas. The translation is written in Judæan Aramaic, though edited in Babylonia probably not before c.400 A.D. (See Bible.) The method of Onkelos is in sharp contrast to that of the other Targums. It seeks to translate literally, keeping very close to the Hebrew text. One of its distinguishing features is the attempt to soften the anthropomorphic expressions of the Pentateuch—"The Word of the Lord," "The Presence of the Lord," or "Glory of the Lord" being used instead of the name of the divinity. In some places, moreover, particularly in the poetic portions (Gen. xlix), Onkelos indulges in midrashic exegesis and weaves in some haggadistic turns. By rabbinical prescription the Targum was to be read along with the Hebrew text—"twice Hebrew and once Targum." For editions and translations, see Targum.

ONNES, ŏn′nĕs, Heike Kamerlingh (1853–). A Dutch physicist, born at Groningen and educated at the university there. He was assistant at the Delft Polytechnic for a time and then became professor of physics at Leyden. From 1883 on he made particular researches in low temperatures, and in 1905 began to study helium, which he prepared from monazite and which in 1908 he liquefied, ascertaining its boiling point, density, and critical temperature. In 1911 he came close to the absolute zero in further experiments with helium. Onnes discovered that at certain temperatures there might be a perpetual electric current through metals. In 1913 he received the Nobel prize for physics.

ONODI, ŏ′nô-dē, Adolf (1857–). A Hungarian laryngologist. Born in Budapest, he graduated in 1881 from the university there, and after some years in Naples at Dohrn's In-

ONIONS, OYSTER PLANT, ETC.



1. CARROT (*Daucus carota*).
2. PARSNIP (*Peucedanum sativum*).
3 and 4. ONION (*Allium Cepa*).
5. LEEK (*Allium Porrum*).
6. GARLIC (*Allium sativum*).
7. OYSTER PLANT (*Tragopogon porrifolius*).

stitute, returned to Budapest in 1886 to be lecturer in anatomy. The following year he took up laryngology, becoming lecturer in that subject (1894) and professor (1897). Among his writings are: *Die Nasenhöhle und ihre Nebenhöhlen* (1893; Eng. trans., *The Anatomy of the Nasal Cavity and its Accessory Sinuses*, London, 1895); *Die Innervation des Kehlkopfes* (1895); *Die Anatomie und die Physiologie der Kehlkopfnerven* (1902); *Die Nebenhöhlen der Nase* (1905); *Der Sehnerv und die Nebenhöhlen der Nase* (1907; Eng. trans., *The Optic Nerve and the Accessory Sinuses of the Nose*, London, 1910); *Die Nebenhöhlen der Nase beim Kinde* (1912).

ON'OMAC'RITUS (Lat., from Gk. *'Ονομάκριτος, Onomakritos*) (c.530–480 B.C). A celebrated Athenian poet. According to Tzetzes (q.v.) he was one of four persons employed by Pisistratus to set in order the *Iliad* and the *Odyssey*, parts of which had become disarranged because the rhapsodists (q.v.) failed to recite the lays in due order. He is said to have written theogonies and to have attached the names of Orpheus and Musæus to compositions of his own. The extant Orphic hymns are, however, of much later origin. He was detected by Hipparchus in the forgery of oracles and exiled from Athens. After the expulsion of Hippias, however, he was on friendly terms with the tyrant, and in his interest urged Darius by pretended oracles to invade Greece. Consult Ritschl, "Onomakritos von Athen," *Opuscula*, 1, 238 ff. (Leipzig, 1866); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (6th ed., Munich, 1914).

ON'OMANCY. See SUPERSTITION.

ON'OMAS'TICON. See DICTIONARY.

ON'OMAT'OPŒ'IA (Lat., from Gk. *ὀνοματοποιία, onomatopoiia*, from *ὄνομα, onoma*, a name, and *ποιεῖν, poiein*, to make). A term denoting the formation of words in imitation of natural sounds, as *cuckoo, cock, clash, rap, whiz, clang.* The theory, termed by Max Müller the bowwow theory, of the onomatopoetic origin of all language, probably recognizes only one of the elements entering into the origin of human speech. In rhetoric it signifies the use of imitative and naturally suggestive words, sentences, and forms for rhetorical effect. See RHETORIC, FIGURES OF.

ONOMICHI, ŏ'nō-mē̆'chē. A seaport in the Prefecture of Hiroshima, Japan, situated on the south coast of Hondo, 52 miles east of Hiroshima (Map: Japan, C 6). It is a prosperous town with narrow streets and a number of interesting temples. Pop., 1908, 30,367.

ONONDAGA, ŏn'*on*-dä'gȧ ([people] of the hill). An important tribe of the Iroquois (q.v.) confederacy and the official guardians of the council fire of the league. Their chief residence was about the lake and creek of the same name in central New York, with jurisdiction extending northward to Lake Ontario and southward to the Susquehanna. Their principal village, which was also the capital of the confederacy, was called Onondaga or Onondaga Castle, and was near the present town of that name, a few miles south of Onondaga Lake. In 1677 it contained 140 houses. The Onondaga were estimated by the Jesuits in 1660 at about 1500 and by Greenhalgh in 1677 at 1750. The interior position of the Onondaga rendered them less prominent than the Mohawk and the Seneca, the two frontier tribes of the confederacy, and they seem also to have been of less warlike disposition. See IROQUOIS.

ONONDAGA LIMESTONE. See DEVONIAN SYSTEM.

ONONDAGA SALT GROUP. The name once given to the series of shales and rock-salt beds which occur in the Silurian system of central and western New York. The name has been superseded by that of Salina formation (q.v.).

ONOTO WATANNA. See WATANNA, ONOTO.

ONTA'RIO (formerly Upper Canada, or Canada West). A province of the Dominion of Canada, lying between lat. 42° and 57° N. and long. 74° and 95° W. The boundaries are very irregular, being determined in part by natural limits. On the north the province touches James and Hudson bays and is separated from Quebec, which lies on the east, by the Ottawa River and the meridian of 79° 31′ W.; on the south it is separated from the United States by the St. Lawrence River, the Great Lakes, and the Rainy River; and along its west confines lies Manitoba. The extent of the province from east to west as well as its extent from north to south is about 1000 miles. The land area amounts to 407,262 square miles and the water area (exclusive of the Canadian Great Lakes) to 41,382 square miles. Ninety per cent of the inhabitants, however, live in the extreme southeast in an area less than 10 per cent of the entire province.

Topography. The surface of Ontario has been worn down to gentle relief by aërial and glacial agencies, so that there is little land above 1200 feet and few, if any, points rise to 2000 feet. The greater part of the area lies in the Laurentian plateau, or the Height of Land, as it extends westward from Quebec, and this constitutes the divide between the water systems of the Hudson Bay and the Great Lakes. The southern portion comprises the lowlands of the St. Lawrence, but is broken by a spur of the northern upland running from Georgian Bay towards the eastern end of Lake Ontario. This spur is somewhat more elevated and broken than the surrounding lowland, and forms on the one hand the Thousand Islands of the St. Lawrence and on the other the high and solid bluffs of the north shores of Lakes Huron and Superior, which are in strong contrast with the low shores of Lake Ontario. An important and interesting elevation is occasioned by the Niagara escarpment, which extends across the peninsula in a northwesterly direction from Niagara Falls to the Blue Mountains, constituting the long projection into Lake Huron forming the Manitoulin Islands to the northwest and causing falls in all rivers which cross it. From the economic point of view this lowland region, the St. Lawrence River, and the Great Lakes are the all-important physical features of the province. The English and the Albany rivers are the most important streams; but there are also numerous lesser streams, whose courses are generally very tortuous and navigable only by canoes. Attractive lakes are scattered over the greater portion of the province, the largest being Lakes Simcoe and Nipissing, east of Georgian Bay, Lake Nipigon, north of Lake Superior, and the Lake of the Woods in the extreme west.

Climate. The climate of southern Ontario, particularly the peninsular portion, is very materially modified by the proximity of the Great Lakes. Although the summers are hot and the winters cold, the extremes are not so excessive as in other inland Canadian regions or the most northern of the United States. Furthermore, the dryness of the atmosphere makes the extremes endurable without great discomfort, and bracing and healthful. In Toronto the mean temperature for the winter months is 23.7° and that for the summer months 65.4°, while at Port Arthur they read 7.3° and 58.9° respectively. The fall is the most pleasant period of the year. In the great northwestern portion of the province the extremes are greater and the winter season is longer. The annual precipitation of the province is between 30 and 40 inches, being well distributed throughout the year. Toronto has a mean of 34 inches and Port Arthur of 24. The winter snows, while not so deep as in the region farther to the northeast, are always sufficient to protect the farmer's crops and to enable the lumberman to secure his supply of logs.

Soil. The soil of the lowland region (see *Topography*, above) is generally of extreme fertility. Loams of the black, clay, and sandy varieties predominate. Much of the great Archean region to the north is rocky and rugged, and the soils are very thin, but sufficient to support a stunted forest growth.

Flora. The plant life of the province is divided into two sections. In that portion of the peninsula which lies west of Toronto are found the oak, hickory, tulip tree, and other varieties of trees and smaller plants which are common in the Ohio region south of the lakes. In the rest of the province the vegetation is sub-Arctic and the principal forest trees are the spruce, the pine and the tamarack, confined largely, however, to the well-drained valleys of the plateau. Originally a dense forest covered almost the whole of the province, but less than one-half is now estimated to be in forest and woodland, the original forest having been entirely removed from the peninsular portion.

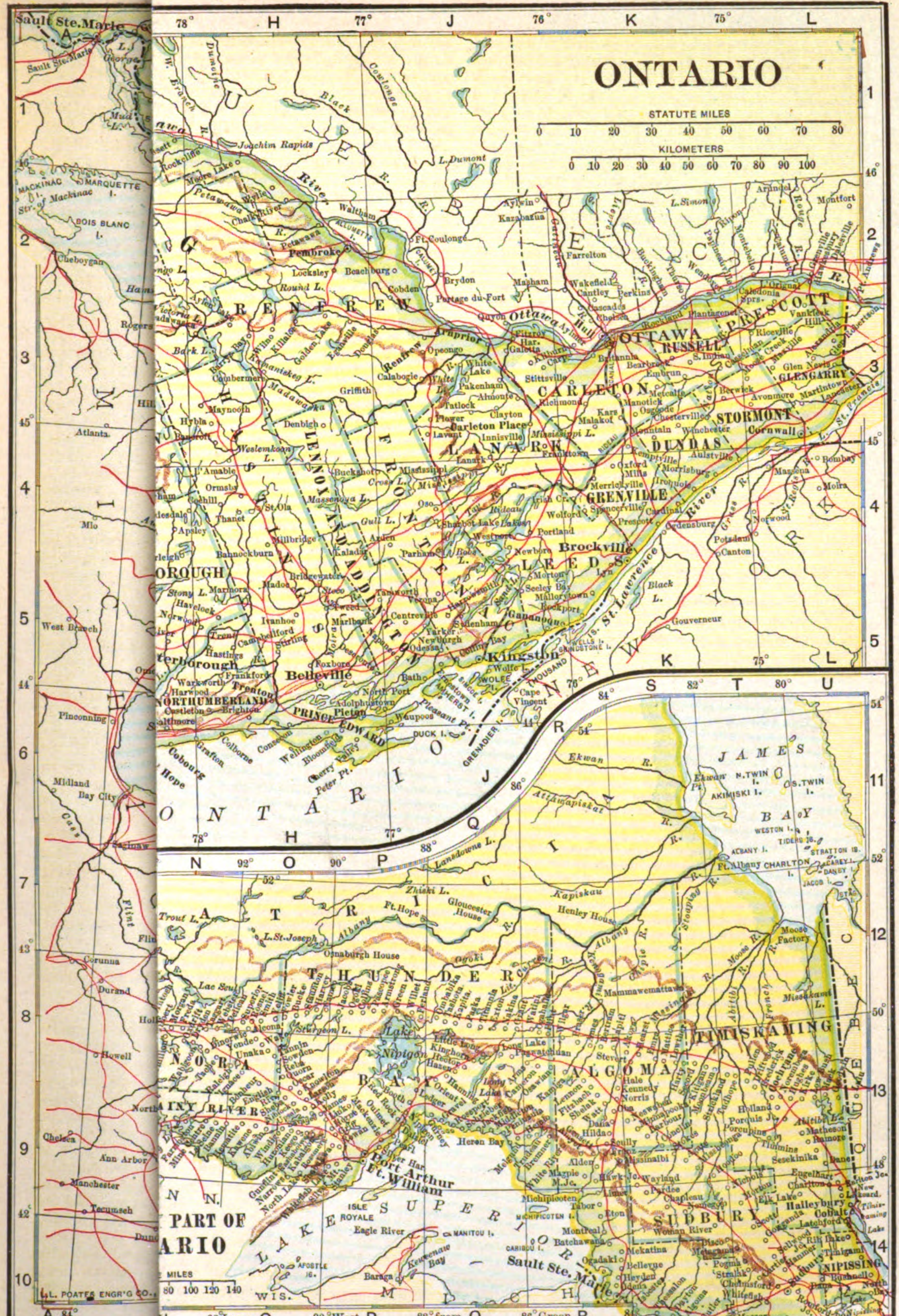
Fauna. Northern Ontario is important as a fur-producing region. It has furnished a large portion of the world's supply of mink, skunk, otter, and other varieties of furs. It is a favorite hunting resort, its large game, especially moose and caribou, having been very abundant. Both fur and game animals are becoming scarce, and protective laws are but partially successful in checking the diminution. See CANADA.

Geology. The entire central parts of the province belonged to the original Archean continent and consist of ancient crystalline rocks of the Laurentian and Huronian series. A tongue of the former, forming the upland spur mentioned under *Topography*, extends southeastward, crossing the St. Lawrence at the Thousand Islands, and terminates in the Adirondacks of New York. The Huronian area is still indefinitely mapped, but it appears chiefly north of Lake Huron (where it is typical) and northwestward along the shore of Lake Superior. The most important mineral ores, especially nickel and copper and the native gold, are found in the Huronian rocks. A relatively small area sloping gently northward from the Laurentian towards Hudson Bay and the southern lowlands, on either side of the Archean spur, are overlaid with Lower Paleozoic strata of the Cambrian and Silurian series, with Devonian strata above and south of the Niagara escarpment, appearing in unbroken continuity with the States south of the Great Lakes.

Mining. Ontario is rich in mineral resources, but a combination of circumstances has until recent years retarded their exploitation. Most of the minerals are found in the Archean rocks beyond the more settled portions of the territory, in the regions to the north of Lakes Superior and Huron. It has been discovered that a considerable portion of those regions, aggregating between 16,000,000 and 20,000,000 acres, is well adapted to agricultural settlement, and the building of new railways has done much to make the mineral resources accessible. Coal is not found in the province and is imported only at great cost, principally from Pennsylvania, while the exportation of the metallic ores into the United States is attended by the extra cost of tariff charges. Nevertheless the decade from 1901 to 1911 witnessed a remarkable growth of the mining industry and the rate of growth since 1911 has increased. The Sudbury nickel-copper deposits, north of Georgian Bay, are the only productive nickel deposits in this hemisphere. The silver-cobalt-nickel arsenides of the Cobalt and surrounding districts are well known, as are also the east Ontario and Porcupine gold fields. There are iron ores in Hastings and Frontenac counties, as well as in the districts north and west of Lake Superior. Deposits of feldspar, corundum, graphite, fluorspar, lead and zinc ores, mica, phosphate, pyrites, and talc are found in east Ontario, while in the south are found petroleum, natural gas, gypsum, and salt. There are iron blast furnaces at Hamilton, Port Arthur, Sault Ste. Marie, Midland, and Deseronto; and there are metallurgical reduction works for nickel, copper, silver, and lead ores at Copper Cliff, Coniston, North Bay, Kingston, Deloro, and Orillia; also electric furnaces for ferro-alloys at Welland, Sault Ste. Marie, and Buckingham. The total mineral production for the calendar year 1913 was valued at $53,232,311, as compared with $41,976,797 for 1911. Of the 1913 production the metallic minerals amounted to $37,507,935 and the nonmetallic to $15,724,376.

Copper is found in almost the whole of the shore region north of Lakes Huron and Superior. It was mined as early as 1846, but active operations in these mines were discontinued in 1876. Its production began again with the development of the nickel mines, the copper being found in combination with nickel. In 1913 the product was valued at $1,840,492. Iron ore to the value of $424,072 was mined in 1913, and in the same year the pig-iron production amounted to $8,719,892. The value of the nickel production in 1913 was $5,237,477, nearly $2,000,000 more than in 1911. The largest product is silver, chiefly from the famous Cobalt (q.v.) mines, and it amounted to $16,579,094 in 1913.

Gold has been found at points along the entire length of the Archean rocks of the province. It is in the most paying quantities, however, in the region west of Lake Superior. The gold lies in quartz veins, and only recently has its exploitation been seriously undertaken. The annual value of the product increased during 1890 to 1899 from nothing to $421,000, but fell in 1904 to about $40,000; but after a comparatively lifeless production, represented in 1911 by a value of $42,625, it suddenly rose to $2,114,086 in 1912 and $4,558,518 in 1913, owing chiefly to the Porcupine deposits. Of the nonmetallic mineral productions the most valuable in 1913 were bricks of all kinds ($5,509,246), calcium carbide ($4,105,455), and lime ($2,362,021). The salt product in 1913 was valued at



ONTARIO
STATUTE MILES
0 10 20 30 40 50 60 70 80
KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
PART OF
ARIO
MILES
100 120 140
L. POATES ENGR'G CO.
92° Long. 90° West 88° from 86° Green.
LAKE ONTARIO
LAKE SUPERIOR
JAMES BAY
QUEBEC
NEW YORK
RENFREW
CARLETON
LANARK
LEEDS
GRENVILLE
DUNDAS
STORMONT
GLENGARRY
PRESCOTT
RUSSELL
FRONTENAC
LENNOX AND ADDINGTON
HASTINGS
NORTHUMBERLAND
PRINCE EDWARD
THUNDER BAY
KENORA
RAINY RIVER
ALGOMA
TIMISKAMING
SUDBURY
NIPISSING
PATRICIA
OTTAWA
Kingston
Brockville
Belleville
Pembroke
Port Arthur
Ft. William
Sault Ste. Marie

$600,297, and natural gas, valued at $2,268,022 in 1912, sank to $398,051 in 1913. Petroleum, which in 1900 amounted to 30,000,000 gallons, has declined to an almost negligible quantity.

Fisheries. Ontario shares with the United States in the fishing advantages of the Great Lakes. The value of the catch in the fiscal year 1913 amounted to $2,842,878. Trout, whitefish, pickerel, and herring are the most important. The Dominion government encourages fish breeding and has seven hatcheries in Ontario. It also facilitates the prompt getting of bait supplies by fishing vessels.

Agriculture. This, the leading industry, is highly developed, especially in the lowland region. The productivity is great, the acreage yield for most crops being greater than the average for the same crops in the United States. No portion of the Dominion is superior in adaptability to mixed farming. The amount of arable land, which is vastly larger than that under cultivation (13,500,000 acres), has been increased by the discovery of vast new tracts in New or Northern Ontario. The area under field crops in 1914 was 8,973,700 acres, and the value of the product was $196,220,000. Hay and clover had 3,171,000 acres, with a product of 3,615,000 tons; oats, 2,840,000 acres, with 99,400,000 bushels; wheat, 834,400 acres, 17,658,00 bushels; barley, 461,000 acres, 13,987,000 bushels; rye, 78,000 acres, 1,341,000 bushels; peas, 179,000 acres, 2,864,000 bushels; buckwheat, 176,000 acres, 4,118,000 bushels; potatoes, 154,000 acres, 25,772,000 bushels; turnips, 114,000 acres, 49,055,000 bushels; flax, 5300 acres, 84,000 bushels. Great attention is paid to apple raising throughout the lowland region, especially in that portion lying west of Toronto. Here, too, especially in the Niagara peninsula, are districts of great fertility, where grapes, peaches, and many other fruits are grown.

Stock breeding is extensively carried on and the province excels in the purity and quality of the various breeds raised. Cattle raising receives the greatest attention; the number, constantly gaining, exceeded 2,601,086 in 1913. Of these 1,141,071 were milch cows, and other cattle numbered 1,460,015. The number of sheep has declined from 1,118,945 in 1909 to 705,848 in 1913. In the same year the number of swine was 1,652,440, and has varied comparatively little. The number of horses is increasing, having been 902,628 in 1913. Dairying is an important industry, the principal branch being cheese making. In 1910 there were 1248 factories and creameries, producing 136,093,951 pounds of cheese, valued at $14,769,566, and 14,085,655 pounds of butter, valued at $3,379,063.

Manufactures. There are many important manufacturing industries in the province, and manufacturing since 1900 has become fairly well developed. Shipbuilding (wooden vessels) was formerly an important industry, owing to the great timber resources. These are now extensively drawn upon in the manufacture of doors, window frames, and furniture. Few countries have at hand such an abundance of water power. The Ottawa River and almost every smaller stream in the province have important falls or rapids, not to speak of Niagara Falls, the rapids along the course of the St. Lawrence, and the immense water power gradually becoming available in the newer and more northerly districts of the province. All these chief sources of power are being extensively utilized.

In 1910 there were 8001 establishments, with a capital of $595,394,608, employing 238,817 persons, paying salaries and wages of $117,645,784 and with an output valued at $579,810,225. The leading manufacturing industries, with the values respectively of their capital and output in 1910, were: electric light and power, $57,660,774, $5,584,091; agricultural implements, $44,201,532, $19,293,088; log products, $39,847,923, $36,530,332; foundry and machine-shop products, $36,130,705, $29,323,360; iron and steel products, $24,354,479, $22,024,705; flour-mill and gristmill products, $22,918,407, $52,721,625; lumber products, $15,160,245, $17,776,684; wood pulp, chemical and mechanical, $14,080,088, $4,487,827; leather, $13,931,385, $14,737,756; distilled liquors, $11,213,298, $10,376,267; electrical apparatus and supplies, $10,753,041, $7,050,000; furniture and upholstered goods, $10,721,185, $9,241,001. The returns for 1900 for the province gave 6543 establishments, with a capital of $214,972,275, employing 161,757 hands, with salaries and wages of $56,548,286 and an output valued at $241,533,486.

Hydroelectric Commission. The provincial government in 1906 passed a law constituting the above-mentioned commission, whose chairman, Hon. (now Sir) Adam Beck, a member of the government, still held both positions in 1915. The ultimate aim was government ownership and regulation, for lighting, heating, manufacturing, and transportation purposes, of the electrical power generated by the Canadian part of Niagara Falls, though other provincial sources of electric power were also within the scope of the commission. Two or three private companies had built plants at the falls, and an increasing knowledge of their objects and equipment started a discussion as to the dangers of monopoly. It was calculated that over 3,000,000 horse power was available at the Canadian falls, and about 4,500,000 horse power was to be had from the undeveloped water powers of central and northern Ontario. These figures, together with Ontario's lack of coal, made government interference a political issue. The Ontario administration entertained the suggestion of freeing the province from imported coal. Sir James Whitney (q.v.), then Premier, finally adopted a policy of governmental ownership and regulation. The commission, which is strictly responsible to the government and through them to the people, enlisted the coöperation of municipalities and built extensive lines for the transmission of electrical power to Toronto and other important places. It made agreements with private companies and proceeded in a conciliatory manner in the public interest. Thus far the power supplied has been chiefly used for lighting and heating, but a substantial beginning was made in meeting agricultural requirements, with the promise of greatly lightening the burdens of farm work. Electrical power for factories and radial railways for bringing the rural districts into closer communication with the cities and towns are likewise included in this policy. The report of the commission for 1913 showed that up to October 31 of that year 555 miles of wood-pole lines had been built to transmit power at voltages of 2200 to 26,400. The number of municipalities taking power was 45, including the more important. The total expense was $1,991,043; the total revenue, $2,611,918. All the municipalities concerned had met their charges during the first nine months of the year. Enough was accomplished by the commission to establish it in the confidence of the people and to vindicate its claim of success thus far as an experiment in government regulation of public interests of high importance.

Transportation and Commerce. The Dominion, the provincial, and various municipal governments have contributed liberally to the construction of railroads, and the mileage has rapidly increased until in 1913 it amounted to 9000 miles, or nearly twice that of any other Canadian province, there being 1 mile of track to every 45.25 square miles of area. There were in 1912, 375,933 miles of telephone wire, of which 249,822 were urban and 126,111 rural. At a number of points the railroads connect with those of the United States. The position of Ontario in relation to the Great Lakes and the St. Lawrence River provides excellent water communication with the markets of the world. Formerly a number of falls and rapids greatly lessened the commercial advantages of these waterways; but the provincial and Dominion governments have constructed a series of canals from Sault Ste. Marie in the north to Lachine Rapids in the east, so that it is now possible for vessels drawing 14 feet of water to pass from the head of Lake Superior through the whole course of the St. Lawrence. The longest of these canals—the Welland, connecting Lake Erie with Lake Ontario—is 26¾ miles in length and cost over $26,000,000. In 1915 this canal was being enlarged by the construction of a new section 8 miles long. The depth of the whole canal was being increased to 25 feet. The severity of the winter season stops navigation during that period, and will always detract somewhat from the otherwise superior advantages of the navigable waters.

The province is rapidly increasing in commercial importance. The imports for 1913 amounted to $310,651,328. Coal is the leading import. The exports for the same year amounted to $132,756,532. The foreign trade of the province is principally with the United States and England. The merchant vessels arriving at Toronto in 1913 numbered 3192, with a tonnage of 1,649,887. Most of them were in the lake trade.

Banks. In 1913 the chartered banks and bank branches of the province numbered 1049. The post-office savings banks numbered 986 in 1913, having 203,098 depositors and $51,110,000 on deposit.

Government. The relation between the provincial and the Dominion governments is somewhat similar to that between the States and the United States—matters of general interest being left to the Dominion government. The great difference to be noted is that in Canada the federal government has jurisdiction in all matters not specifically reserved to the provincial governments; while in the United States the Federal government has jurisdiction only in those matters specifically reserved to it under the Constitution, the unspecified residuum coming within the jurisdiction of the States. See CANADA.

The provincial government is administered by a lieutenant governor, appointed for five years by the Governor-General of the Dominion with the advice of the Prime Minister. He is advised by an executive council of eight members, which includes an attorney-general, minister of agriculture, provincial secretary, provincial registrar, provincial treasurer, minister of lands, forests, and mines, minister of public works, and minister of education. The system of parliamentary or responsible government in force in federal politics obtains also in the province. The Legislature has only one House of 111 elective members. Voting is by ballot, and there is manhood suffrage limited by residence and citizenship. The judicial power is vested in a supreme court of judicature, consisting of the High Court of Justice (with King's Bench, Common Pleas, and Chancery divisions) and the Court of Appeal. The judges of the Supreme Court are appointed by the Governor-General in Council, but their salaries are paid by the province. In the Dominion Parliament the Province of Ontario is represented by 24 Senators and 86 members of the House of Commons.

The division of the province for purposes of local government is similar to the system found in the United States. The organized portion is divided into counties, and these are subdivided into townships. The larger and less completely organized portion in the north is divided into districts. The more densely populated groups are classified according to size into villages, towns, and cities. The governing body in each of these units of government consists of an elective council. There are also administrative officers.

Finance. General property taxes are levied only for local purposes, the provincial government having sufficient income from other sources to meet all expenses and keep free from indebtedness. The two main sources of the provincial revenues in 1913 were the Dominion subsidy of $2,396,378 (see CANADA) and the revenue of $2,793,810 from the public lands, forests, and mines, a commission being charged for the privilege of cutting timber in the forests and dues also being collected on the amount cut. Other important sources of revenue were the liquor licenses ($901,486), the succession duties ($1,062,695), the sale of law stamps ($134,483), the Dominion subsidy to the Timiskaming and Northern Ontario Railway ($954,629), public institutions, asylums, etc. ($310,300), and the hydroelectric commission ($207,806). The receipts and expenditures of the provincial government for 1913 amounted to $11,188,302 and $10,868,026 respectively. The province extends certain aids to the county municipalities, as, e.g., in the administration of justice. The law places a maximum limit upon the local tax rates, and a proposal to make a permanent debt must receive the sanction of the people. The chief items of provincial expenditure in 1913 were education ($1,969,292), public institutions, asylums, etc. ($1,366,039), agriculture ($693,391), and administration of justice ($715,934).

Population. Ontario, with 2,523,274 inhabitants (1911), is the most populous province of Canada and contains about two-fifths of the total population of the Dominion. This is an increase of 340,261 over the population in 1901. The birth rate is not low, but the province loses considerably through emigration to the Canadian Northwest and the United States. The large majority of the population is of English, Scotch, and Irish descent, and in Toronto, Ottawa, and Hamilton, there have been during 1900–15 large increases in the foreign-born population. The early development of Ontario profited from the migration of New England opponents of the War of 1812.

The census of 1911 returned the population of the largest cities and towns as follows: Toronto, the capital, 376,538; Ottawa, 87,062; Hamilton, 81,969; London, 46,300; Brantford, 23,132; Kingston, 18,874; Peterborough, 18,360; Windsor, 17,289; Fort William, 16,499; Berlin, 15,186; Guelph, 15,175; St. Thomas, 14,054; Stratford, 12,946; Owen Sound, 12,559; St. Catherines, 12,484; Port Arthur, 11,220; Sault Ste. Marie, 10,984; Chatham, 10,770; Galt, 10,299.

Indians. The number of Indians was 26,077 in 1913, as compared with 23,898 in 1909. The government furnishes educational advantages for the Indian children, and the Indian is generally adopting agricultural and other occupations characteristic of civilized life.

Religion. There is no state church, and all the churches are supported on the voluntary principle. The province is strongly Protestant, the ratio between the Protestants and Roman Catholics being about 5 to 1. Of the Protestant denominations, the Methodists led in 1913 (671,727), followed by the Presbyterians (524,603), Anglicans (489,704), and Baptists (132,809). The several bodies of Methodists have been united into one church, as have been also the several bodies of Presbyterians. In 1915 and for more than 10 years previous to that year a movement had been gaining strength for the union of the Methodist, Presbyterian, and Congregational churches of Canada. Ontario is the centre of this movement.

Education. Great attention is given to education, and the educational system is complete in scope, progressive in spirit, and efficient in administration. The taxpayers elect local boards of trustees, who have immediate control of the schools, but they are administered in accordance with the general regulations of the Minister of Education, and all follow a uniform course of study, use the same textbooks, and are taught by teachers who have passed the provincial examination. The schools are free, and attendance is compulsory. Nevertheless education cannot be said to be completely unsectarian, inasmuch as under certain conditions both Roman Catholics and Protestants may establish separate schools which will be supported from the public taxes and appropriations (such schools continuing under the control of the Minister of Education). This state of affairs is the result of prolonged struggle in the earlier stages of the history of the province, when, as part of the Province of Canada (1841–66), Reform leaders opposed separate schools for the Roman Catholics. The exercise of this privilege, however, has not become common, a very large majority of the school children attending the unsectarian schools. In the calendar year 1912 there were 5939 public schools, with 405,725 enrolled pupils, an average attendance daily of 251,475, and 9520 teachers. There were only 513 Roman Catholic and six Protestant separate schools. The average cost of pupils per head of the population in 1912 was $5.26. Of the total receipts for education the same year ($14,258,052) the municipalities contributed $9,478,887, the clergy reserves $3,936,887, and legislative grants $842,278. Since the increase of French-Canadian population in Ontario a demand has arisen for bilingual schools. See *Canada* in NATIONAL EDUCATION, SYSTEMS OF. There are additional aids to "poor sections," and the policy of pensioning superannuated teachers has long been in vogue. All the schools are in the hands of trained teachers, two-thirds of whom are females, the government having provided for their training through the maintenance of a large number of county model schools, seven normal schools, with 1200 teachers in training, one normal college, and the faculty of education in Toronto University. The breadth of the public-school system is shown in that it extends from the kindergartens to the university and includes (besides those mentioned above) high schools, night schools, and the Ontario Agricultural College, the last being located at Guelph. Instruction in agriculture is becoming common in the rural schools. The school course provides the rudiments of a business education, and manual training is being introduced. The Provincial University and University College at Toronto, with their affiliated institutions, are at the head of the provincial school system. The affiliated institutions are Victoria (Methodist) and Trinity (Anglican) universities, St. Michael's College (Roman Catholic), Knox College (Presbyterian), Wycliffe College (Anglican theological), Toronto Conservatory of Music, Toronto College of Music, Hamilton Conservatory of Music, Royal College of Dental Surgeons, Ontario College of Pharmacy, Ontario Agricultural College, and Ontario Veterinary College. There are a number of other private, technical, and denominational colleges in the province, including McMaster University (Baptist), Ottawa University (Roman Catholic), Western University, Huron College, and the historic Upper Canada College, an institution founded in 1829 by Sir John Colborne, then Lieutenant Governor of Upper Canada, on the model of the English public schools, Eton and Rugby. None of these institutions is now sectarian in its requirements of admission. Queen's University, Kingston, founded originally by the Presbyterians, is one of the best universities in the Dominion, and unsectarian.

History. The permanent settlement of the province dates from the immigration of United Empire Loyalists (q.v.) during the Revolutionary War and after its close in 1783. By the Constitutional Act of 1791 it became the Province of Upper Canada, with a separate Legislature composed of an elective assembly and an appointive legislative council. In the War of 1812 it was the scene of numerous Anglo-American conflicts, notably the battles of Queenston Heights, Beaver Dams, the Thames, and Lundy's Lane. In 1841 it was reunited with Lower Canada (Quebec) after a rebellion in 1837 headed by William Lyon Mackenzie (q.v.), which was the culmination of a long struggle for responsible government; and in 1867, after a period of deadlock which threatened to disrupt the Union of 1841, it received its present name and entered the Dominion of Canada, a federation in which Ontario's rights and powers as a separate province were defined and safeguarded. Its history as a province of the Dominion has been chiefly identified with the successful defense of the rights granted under the British North America Act of 1867. Disputes with the Dominion as to boundaries, control of liquor licenses, and riparian rights were uniformly decided in favor of the province by the Judicial Committee of the Privy Council, the highest court of British colonial appeal. After the beginning of the twentieth century a great deal of energy was shown in developing the resources of New Ontario, that portion of the province lying north of the Canadian Pacific Railway from North Bay on the east to Port Arthur on the west, and north of the United States boundary line from the west shore of Lake

Superior to the boundary of Manitoba. It has an area of 300,000 square miles and, though formerly supposed to be mostly rocky and barren, is now known to contain between 16,000,000 and 20,000,000 acres of agricultural land. The Timiskaming and Northern Ontario Railway, a government enterprise, was built northward to the transcontinental railway lines traversing the province, and the land was opened to settlement and mining operations. About 1906, during the administration of Sir James Whitney (q.v.), the question of using the immense water power of the Canadian side of Niagara Falls began to be considered and ultimately was made a part of the Conservative party's policy. (See *Hydro-electric Commission.*) For several years the chief issue between the rival parties has been the suppression of the liquor traffic within the province, the Liberals, led by Newton Wesley Rowell (q.v.), advocating abolition of the bar and the Conservatives opposing it with a license system. On the outbreak of the War in Europe in 1914 Ontario was foremost in supplying volunteers for the different contingents of military forces.

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ONTARIO. A city in San Bernardino Co., Cal., 38 miles east of Los Angeles, on the Salt Lake Route, the Southern Pacific, and the Santa Fe and Pacific electric railroads (Map: California, H 8). The city is situated in a fertile region adapted to the growing of citrus and deciduous fruits, alfalfa, and grapes. The chief industrial establishments are a large manufactory of various electric-heating devices, two canneries, packing houses, nurseries, and an irrigator-supply factory. The high school consists of a group of five beautiful buildings, and there is a public library. Ontario owns its water works. Pop., 1900, 722; 1910, 4274.

ONTARIO, Lake. The most eastern and the smallest of the five great lakes of North America, being less than one-fourth as large as Lake Superior. It lies between lat. 43° 10′ and 44° 8′ N. and long. 76° 30′ and 80° W. and is inclosed by the Canadian Province of Ontario and New York State (Map: United States, Eastern Part, L 2). It has a water surface of 7243 square miles, of which only 1891 are within the jurisdiction of New York State, the larger part of the lake being Canadian. It is 190 miles long, 53 wide in its widest part, and about 480 miles in circumference. Its distinctive hydrographic basin is 28,840 square miles in area. Its mean elevation is 247 feet above tidewater in the Atlantic (being 326 feet below Lake Erie), its maximum depth is 738 feet, its approximate mean depth is 300 feet, and the depth of its basin below the sea level is 491 feet, its bottom being lower in relation to sea level than that of any other of the Great Lakes. The lake is fed principally by the Niagara River. The Genesee, Oswego, and Black rivers enter from the south, and the Trent, flowing through the Bay of Quinte, a long, crooked arm which extends about 50 miles into the land, enters from the north. The water discharge of the St. Lawrence basin has been found to be slightly less than half its rainfall. Lake Ontario, lying at the foot of the chain of lakes, has naturally the largest discharge, 300,000 cubic feet per second, as compared with 265,000 for Lake Erie, 235,000 for Lakes Huron and Michigan, and 86,000 for Lake Superior. The lake is sufficiently deep throughout for vessels of the largest tonnage and is generally free from shoals. The land rises gradually from the north shore, forming broad stretches of farm lands. The south shore from Sodus to the Niagara River is marked by an escarpment lying from 3 to 8 miles back. The lake freezes only a few miles from the shore, which is due in part to the frequent agitation of its waters by violent storms and also to a persistent surface current established through its centre which moves to the east, with return currents and eddies along the shores and about the islands. This surface current is due to the fact that the larger axis of the lake coincides with the direction of the prevailing westerly winds. There are many convenient harbors and thriving ports, chief among which are Kingston, Port Hope, Cobourg, Toronto, and Hamilton on the Canadian shore, and Oswego, Sacketts Harbor, and Charlotte in New York. Many lighthouses along the coasts facilitate navigation, and the lake is connected with Lake Erie by the Welland Canal, with the Erie Canal and the Hudson River by the Oswego Canal, and with the Ottawa River by the Rideau Canal. See Great Lakes.

ONTENIENTE, ôn'tâ-nyān'tâ. A town of eastern Spain, in the Province of Valencia, 45 miles south of Valencia, on a branch of the railroad between Valencia and Madrid (Map: Spain, E 3). It was formerly fortified. Linen and woolen fabrics and paper are manufactured. Pop., 1900, 11,441; 1910, 12,390.

ONTOG'ENY (from Gk. *ὤν*, *ōn*, being + *-γένεια*, *-geneia*, production, from *γίγνεσθαι*, *gignesthai*, to become). The development of the individual animal, in contrast to *phylogeny*, or the development of the entire class. The development of the individual is accomplished in a few hours, or years, at the most, while that of the order or class or phylum may extend through several geological ages and is represented by a series of forms so related that they appear to be blood relations and descendants from a primitive type. (See Phylogeny.) The ontogeny of any animal is the successive stages it passes through in the course of its development after the fertilization of the egg until it reaches maturity. Such a series of stages roughly corresponds to and epitomizes the development or phylogeny of the class. See Recapitulation Theory.

ONTOL'OGY (from Gk. *ὤν*, *ōn*, being, pres. p. of *εἶναι*, *einai*, to be + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). A term applied to that department of metaphysics (q.v.) which deals with the ultimate nature of the universe conceived as being. With many philosophers ontology is made so inclusive as to be practically identical with metaphysics (q.v.).

O'NUS PROBAN'DI (Lat., burden of proving). In the most general sense, the logical necessity or obligation of establishing a proposition asserted by one, whether by argument and reasoning or by the citation and proof of facts. In English and American law the expression is employed only in the latter sense, of the burden of establishing an asserted fact either by direct proof of its existence or by the proof of other facts from whose existence the truth of the fact asserted will reasonably be inferred. See BURDEN OF PROOF; EVIDENCE; PROOF.

ONYCHASTER, ŏn'ĭ-kăs'tēr (from Gk. *ὄνυξ*, *onyx*, claw, + *'αστήρ*, *astēr*, star). A genus of asterozoa occurring fossil in several species in the Lower Carboniferous rocks of the Mississippi and Ohio basins. It is characterized by its round arms, which are covered with fine scales and are mostly rolled up. Although in its aspects it is one of the brittle stars and is currently referred to them, it is now known to belong to a group (Auluroidea) that is transitional between the starfishes and brittle stars. See ECHINODERMATA.

ON'YX (Lat. *onyx*, from Gk. *ὄνυξ*, nail, veined gem, onyx, thickening in the cornea of the eye; connected with Lat. *vinguis*, OIr. *inga*, nail). A cryptocrystalline variety of quartz (q.v.), consisting of layers of chalcedony of different colors, usually white and black or white and dark brown. The finest specimens of this mineral are brought from India, although it occurs in small quantities in many other localities, such as the Lake Superior region and near the Bay of Fundy. It was highly esteemed by the ancients, who used it for ornamental purposes. See GEMS.

ONYX MARBLE. A beautiful ornamental stone composed chiefly of carbonate of lime colored by iron or manganese. This is the commercial variety of onyx, while true onyx is a banded variety of quartz. Commercial onyx marble really includes two rock types, both of which are chemically deposited. The one is a hot-spring deposit or travertine, which is formed on the surface, the other is a cold-water deposit which is formed on the floor, roof, or walls of limestone caves in the same manner as stalagmites and stalactites. Owing to its method of formation the cave onyx usually occurs in less extensive deposits than the travertine onyx marbles, which have been formed around springs, and both are far less extensive and less regular in their arrangement than the ordinary bedded limestones or marbles. The beautiful banding seen in onyx is due to the deposition of successive layers of carbonate of lime, while the colored cloudings and veinings are caused by metallic oxides, especially iron. The fact that onyx marble is colored along the veins or cracks is not necessarily due to an infiltration of the iron along these lines, but is caused by the iron carbonate in the stone being locally oxidized along the cracks. The cave onyx marbles are more coarsely crystalline and less translucent than the travertine onyx. Onyx marbles, although rarely occurring in large quantities, are widely distributed. The earliest worked deposits were probably those of Egypt, which were used by the ancients for the manufacture of ornamental articles and religious vessels. The Greeks and Romans also valued the material; the deposits near Urumiah and Yezd were extensively worked during the prosperous days of the Persian Empire. Many of the spring deposits occur in regions of recent volcanic activity and all of the known occurrences are of recent geological age. In the United States onyx marbles are said to occur in Arizona, California, and Colorado, but the American deposits have not been developed commercially to a large extent, most of the onyx used in the United States being obtained from Mexico, while small quantities are imported from Algeria and Egypt. The Mexican stone has for years been obtained chiefly from the vicinity of Pueblo and more recently from the vicinity of San Antonio. Mexican onyx is the name given to banded varieties of aragonite that are found extensively in Arizona, Missouri, and California, as well as in Tecali, Mexico. It is used for decorative purposes. The value of onyx varies considerably, the poorer grades selling for as little as 50 cents per cubic foot, while the higher grades bring $50 or more.

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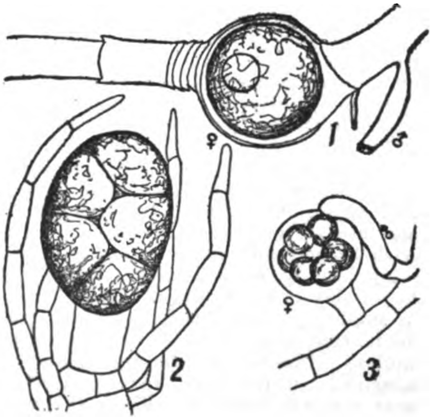
OO, ō'ō', or **UHO,** ōō'hō'. One of the names of the Hawaiian feather-cloak bird. The bird is so called from its cry. See MOHO, and Plate of CREEPERS.

OODEYPORE, ōō'dī-pōr'. A native state in India. See UDAIPUR.

O'ÖGO'NIUM (Neo-Lat., from Gk. *ᾠογονεῖν*, *ōogonein*, to lay eggs, from *ᾠόν*, *ōon*, egg + *γονή*, *gonē*, generation). An organ in the algæ and fungi (thallophytes) which develops the eggs (oöspheres), hence the female sex organ. It is generally a single cell, but may bear accessory structures. The oögonium of the algæ was derived from a cell producing undifferentiated gametes (sex cells). In the process of sexual evolution similar gametes became differentiated into eggs and sperms; the structure bearing the eggs is called the oögonium and that developing the sperms the antheridium. The simplest and most primitive oögonia probably contained several eggs, although there are not now many illustrations of such conditions among the algæ. That is to say, the evolutionary tendency in the development of oögonia is to reduce the number of eggs until all of the protoplasm



OÖGONIA IN: 1, ŒDOGONIUM; 2, FUCUS; 3, ACHLYA.

is devoted to one. Such highly differentiated oögonia are well illustrated in *Vaucheria*, *Œdogonium*, and *Volvox*. *Chara* and *Coleochæte* present further complications in the form of filaments that invest the cell containing the egg with a protective covering. The oögonia of fungi are in general similar to those of algæ and are probably derived from them. They are found chiefly in the group of the Phycomycetes, which is closely related to the algæ, but homologous structures are found in the Ascomycetes, although they generally bear the name of ascogonium or archicarp. The best illustrations of oögonia in the fungi are furnished by the water molds (Saprolegniales) and such well-known genera as *Albugo* (*Cystopus*), *Pythium*, and *Peronospora*.

OO'JEIN'. A town of Malwa, Gwalior, Central India. See UJJAIN.

OOLACHAN, ōō'lȧ-kȧn, or **EULACHON,** ū'lȧ-kŏn. See CANDLEFISH.

OÖLITE, ō'ō-līt (from Gk. *ᾠόν*, *ōon*, egg + *λίθος*, *lithos*, stone). A term formerly used as synonymous with Jurassic, but now used to designate the middle and upper divisions of the Jurassic rocks, the lower division being called the Lias. In the United States the Oölite is of little importance, and in fact has only been identified along the Pacific coast, but in Europe it underlies a vast area, for during this period of geologic time there occurred one of the greatest encroachments of the sea over Europe and Asia which is known in geologic history. The rocks of the Oölite period are chiefly limestones. They are perhaps best known from their occurrence in the Jura Mountains of Switzerland, where the rocks have been bent into such beautiful folds as to attract the attention of the most casual observer. See JURASSIC SYSTEM.

OÖLOGY, ō-ŏl'ō-jĭ (from Gk. *ᾠόν*, *ōon*, egg + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). The science of eggs; especially the study of the breeding habits, nests, and eggs of birds; a branch of ornithology. Birds' eggs are conveniently classified as marked and unmarked, according to the ground color. Birds which lay their eggs in holes in trees or in the ground almost always have white, unspotted eggs, and they are frequently of a peculiarly smooth, translucent texture. Birds which build in trees generally have blue or greenish eggs, either spotted or unspotted, while birds that build in bushes, near the ground, are likely to lay speckled eggs. The shore birds usually have the eggs heavily marked with dark brown on a yellowish background, while gulls and terns always lay heavily marked eggs. Ducks, geese, and herons lay unspotted eggs. Some birds lay only a single egg, and this is especially true of certain marine birds, such as auks, guillemots, and murres. Others lay two eggs, notably the hummingbirds, while three, four, and five are the most common numbers. When the number is more than 18, there is reason to believe that more than one female has been concerned in the laying, as happens among ostriches and mound birds. Gallinaceous birds and ducks, coots, and rails lay the largest number of eggs; the quail is said to lay 18, the coot 15, the wood duck 14, and the sora 16. There is no direct relation between the size of the bird and the size of the egg. The smallest eggs actually, and proportionately also, are those of hummingbirds, which may be less than half an inch long by one-third of an inch wide. The largest eggs actually are those of the ostrich, but proportionately the eggs of the apteryx and mound birds are much larger. Of North American birds the largest eggs are probably those of the California condor, which are 4.5 by 2.5 inches. The swan lays an egg nearly as large, but does not breed within the United States. The great auk, though a much smaller bird than either of these, laid an egg 5 by 3 inches; but very few of them are now in existence. (See GAREFOWL.) The study of birds' nests is sometimes called caliology, as distinguished from oölogy proper. See NIDIFICATION.

Dr. Thomas M. Brewer (q.v.) may well be called the father of American oölogy, for his *North American Oölogy*, a quarto which appeared in 1857, was the first systematic work dealing with that subject published in the United States. Unfortunately only one part of this was ever printed, but it is notable for its colored plates of birds' eggs. Capt. Charles E. Bendire (q.v.) became famous as an oölogist in the West, and in 1883 was appointed a curator in the National Museum. In July, 1892, appeared the first volume of his *Life Histories of North American Birds*, and the second volume appeared in September, 1896. They are quarto volumes of many hundred pages and numerous colored plates. This magnificent but unfinished work has now been taken up by A. C. Bent. An earlier descriptive work was Ernest Ingersoll's *Natural History of the Nests and Eggs of North American Birds*, of which seven parts, describing the nidification of about 100 species of oscine birds, with colored plates of their eggs, were issued at Salem, Mass., in 1879–80. Other books dealing exclusively with American oölogy have been: T. G. Gentry, *Nests and Eggs of the Birds of the United States* (Philadelphia, 1885), and Oliver Davie, *Nests and Eggs of North American Birds* (5th ed., Columbus, 1898). Several fine works describe the eggs of European and East Indian birds, among them being W. C. Hewitson, *Illustrations of Eggs of British Birds* (3d ed., London, 1856). For others consult Newton, *Dictionary of Birds* (New York, 1893–96). See EGG and the accompanying colored plates.

OOMS, ōms, KAREL (1845–1900). A Belgian historical painter, born at Desschel, Province of Antwerp. He studied at the Antwerp Academy and under Nicaise de Keyser and later traveled extensively. He painted chiefly the stilted historical pictures so popular in his generation. They include: "The Death of the Duke of Alba"; "Philip II Paying the Last Honors to Don Juan d'Austria," in the Antwerp Museum; "Forbidden Reading," Brussels Museum; "Innocence Protected by Law," Palais de Justice, Antwerp.

OÖMYCETES, ō'ō-mī-sē'tēz. One of the two great divisions of Phycomycetes (q.v.), distinguished from the other group (Zygomycetes, q.v.) by being heterogamous (see HETEROGAMY) and producing zoöspores. The conspicuous representatives of the group are the water molds (*Saprogelnia*, q.v.) and the downy mildews (*Peronospora*, q.v.).

OÖPHORECTOMY, ō'ō-fō-rĕk'tō-mĭ. See CASTRATION.

OORI, ōō'rē, or **URI,** ōō'rē. A river in Africa. See LIMPOPO.

OORIAL, ōō'rĭal, or **URIAL.** The name in the Punjab of a wild sheep (*Ovis vignei*), called sha in Ladak. It is a large, powerful species, which is to be found on the high mountains from eastern Persia to northern Tibet. The horns of the rams are heavy, rounded, much wrinkled, rise close together, and sweep around, so that in old specimens they almost complete a circle. A ruff of hair on the throat is usual. These wide-ranging and variable sheep are very wary and agile and give the sportsmen a hard chase. The young are often captured, however, and wild bands often mingle with native sheep on remote hill pastures. Consult: W. T. Blanford, *Fauna of British India: Mammals* (London, 1889); Richard Lydekker, *The Game Animals of India* (ib., 1907); and writers upon natural history and sport in Central Asia. See Plate with WILD GOATS.

O′ÖSPHERE (from Gk. *ᾠόν, ōon*, egg + *σφαῖρα, sphaira*, ball). A general name given to the female sex cell (gamete), and of course used only with heterogamous plants, in which the pairing gametes are unlike in appearance and behavior. It is the oösphere which upon fertilization becomes the oöspore (q.v.). The name is being abandoned for the simpler word "egg." See EGG (in plants).

O′ÖSPORE (from Gk. *ᾠόν, ōon*, egg + *σπόρος, sporos*, seed). A general name given to the cell (in plants) which is the result of fertilization. Frequently the term is restricted to the fertilized eggs of heterogamous plants, i.e., those whose pairing gametes are unlike (sperms and eggs). In this case the word "zygospore" is used for the sexually formed spore of isogamous plants, i.e., those whose pairing gametes are alike. The oöspore is more appropriately called the fertilized egg. Since it is becoming increasingly difficult and undesirable to distinguish between oöspore and zygospore, the term "zygote" is coming into general use to indicate the cell which is the product of sexual fusion. See FERTILIZATION; SPORE.

OÖSTEGITE, ō-ŏs′tē-jīt (from Gk. *ᾠόν, ōon*, egg, + *στέγειν, stegein*, cover). The name applied to the egg case of certain crustaceans.

OOSTERHOUT, ō′stẽr-hout. A town in the Province of North Brabant, Holland, 25 miles southeast of Rotterdam (Map: Netherlands, C 3). The handsome town hall, the great Roman Catholic church in the market place, and the convent of St. Catharine in the vicinity are among the town's notable edifices. The manufacturing establishments include beet-sugar refineries, tanyards, potteries, shoe factories, and iron foundries, and there is an active trade in wood, linen, and agricultural products. Pop., 1904, 11,946; 1909, 12,563.

OOSTERZEE, ōs′tẽr-zā′, JOHANNES JACOBUS VAN (1817–82). A Dutch preacher and theologian, born at Rotterdam. He was educated at the University of Utrecht, where, after becoming famous as a preacher at Alkmaar and Rotterdam, he was appointed professor of theology in 1863. In 1845 he became one of the editors of the *Jaarboeken voor wetenschappelijke Theologie*. His publications include: *Het leven van Jezus* (1850; 2d ed., 1863–65); *Theologie des Nieuwen Verbonds* (2d ed., 1872; Ger. trans., 2d ed., 1886; Eng. trans. by G. E. Day as *Theology of the New Testament*, 1871); *Christelijke Dogmatiek* (2 vols., 1870–72); *Practische Theologie* (2 vols., 1877; 2d ed., 1895–98; Ger. trans., 2 vols., 1878–79); an autobiography *Uit mijn levensboek, voor mijne vrienden* (1882; 2d ed., 1883). His complete works were published in French (3 vols., 1877–80).

OOTACAMUND, ụt′ȧ-kȧ-mŭnd′. A fashionable hill-town resort and the summer headquarters of the Madras administration, in the Nilgiri Hills, Madras, British India, 36 miles northwest of Coimbatore and 350 miles southwest of Madras (Map: India, C 7). A good macadam road, 12 miles long, leads from Coonoor, the nearest railway station. The town occupies a hill-encircled plateau 7500 feet above sea level. The surrounding hills (Dobetta, 8760 feet, being the highest) command views of magnificent scenery. The Government House, the public library, the Lawrence Asylum, with technical branches for soldiers' children, the churches of St. Stephen and St. Thomas, Victoria Hall, Assembly Rooms, Bruks Memorial School, Hobart Park with fine athletic grounds, the botanical gardens, and the lake drive are some of the principal features. In the neighborhood are numerous tea, coffee, cinchona, and eucalyptus plantations. There are manufactures of beer and soda water. The mean annual temperature is 55° F. Pop., 1901, 18,596; 1911, 18,829.

OOTRUM, o͞o′trŭm (Dravidian *ōtrum*). A fibre derived from the stem of *Dæmia extensa*, an East Indian shrubby climbing plant of the family Asclepiadaceæ. The fibre is soft, white, silky, and strong, and is regarded as a promising substitute for flax. In some parts of the Deccan the plant is a troublesome weed.

OOZE. The fine homogeneous sediment, like mud, but softer and more sticky, forming a plastic floury substance, which constitutes a large portion of the bottom in the deeper parts of the ocean. As this ooze is principally made up of the shells of *Globigerina bulloides*, a surface foraminifer, it is generally called globigerina ooze. As early as 1850 Pourtalès stated that at depths of 257 fathoms "Globigerinæ are still living in immense numbers." He stated that at great depths in the Strait of Florida the bottom is covered by a chalklike layer, which resolves itself into a mass of Foraminifera and their fragments more or less comminuted. This formation extends, he says, almost uninterruptedly in the whole bed of the Gulf Stream, in the greater depths of the Gulf of Mexico, in the deep channels which intersect the Bahama Banks, and then up the Atlantic coast from about the 100-fathom curve outward, or from the inner limit of the Gulf Stream, which nearly coincides with it, and so over the greater part of the Atlantic basin. The discovery of this formation belongs to the year 1853, when it was found almost simultaneously by Lieutenants Craven and Maffit, then in the Coast Survey and exploring the Gulf Stream. It became more extensively known somewhat later by the soundings made for the Atlantic telegraph. The Foraminifera most abundantly represented in this bottom are of the genus *Globigerina*. Then occurs in order of frequency *Rotalina cultrata;* then several Textulariæ, Marginulinæ, etc. It is now pretty generally admitted that these rhizopods live and die in these great depths; but that animals living near the surface also contribute a large proportion is proved by the numerous shells of mollusks, teeth of fishes, etc., contained in it. The *Challenger* expedition explorations established that the pelagic bottom deposits are not derived from the shores of the continent, but are formed in the deep water of the central regions of the great ocean basins and consist of organic oozes and a reddish clay. They are chiefly made up of the calcareous and siliceous remains of organisms that have fallen to the bottom from the surface waters, along with clay and volcanic débris in a more or less advanced state of decomposition. There is little or no trace of mechanical action on their components, their accumulation is relatively slow, and among them there do not appear to be any accumulations of materials identical with the marine stratified rocks of the continental areas. It seems doubtful, says Murray, whether the deposits of the abysmal areas have in the past taken any part in the formation of the existing continental masses.

A pteropod ooze is met with in depths of less than 2000 fathoms in the tropics and is very largely made up of pteropod and heteropod shells, which also exist in considerable numbers in the deposits around oceanic and other islands.

In radiolarian and diatom oozes the deposits consist of siliceous skeletons and frustules of surface organisms, which have likewise fallen from the surface waters. A radiolarian ooze has hitherto been met with only in the deepest waters of the western and central Pacific, and diatom ooze appears to be confined to the Southern Ocean, a little north of the Antarctic circle.

Thus it will be seen, as Agassiz has pointed out, that the character of a marine deposit is largely determined by its distance from land and again by the nature of the organisms living in the surface waters. The dead shells of pteropods, foraminifers, radiolarians, and diatoms are heaped up on the bottom, some in one part of the ocean, some in another; and as no other materials reach these distant regions to cover them, they form characteristic deposits. Depth is, however, an important factor in reference to the composition of a deposit in any locality. There seems to be now no doubt that the whole of the carbonate-of-lime shells, such as those of mollusks and foraminifers, are entirely removed by solution in very deep water during their fall from the surface to the bottom, or immediately after reaching the bottom. It is found that, with increasing depth, the pteropod and heteropod shells are the first to disappear from deposits, then the more delicate surface foraminifers, and finally the larger and heavier ones. It is likewise observed that the more numerous these are in the surface waters the greater is the depth at which they will accumulate at the bottom. As a rule, a pteropod ooze or a globiberina ooze is found in deeper water in the tropics than in temperate regions.

It must be remembered that all the bottom deposits merge into one another, and at times it is difficult to say whether a deposit should be called a red clay, or a radiolarian ooze, or a globigerina ooze, or a blue mud. It was thought by Pourtalès and others that the *Globigerina* lived in the oozes at the sea bottom; but the *Challenger* observations have clearly established that many foraminifers have a pelagic mode of life (see PELAGIC ANIMALS), flourishing in the pure currents of the open ocean, nearly all the species being confined to tropical and subtropical waters. There are not more than 20 or 22 species of pelagic Foraminifera; yet, says Murray, so numerous are the individuals of the species that they usually make up over 90 per cent of the carbonate of lime present in the calcareous oozes of the abysmal regions. The individuals belonging to even a dozen of these species far outnumber the individuals belonging to all the other known genera and species of Foraminifera. This is true not only with regard to their abundance in the deep-sea deposits of the present period, but also to their great development in Tertiary and other geological formations. Murray adds that the species of Foraminifera which live on the bottom in deep water "are habitually under very uniform conditions, and consequently their shells do not vary in size and thickness with change of latitude like those of the pelagic species, the animals of which are subject to great changes of temperature and salinity in the surface waters."

Consult: L. F. Pourtalès, in *Report of the United States Coast Survey* (Washington, 1853); Alexander Agassiz, *Three Cruises of the United States Coast and Geodetic Survey Steamer Blake* (Cambridge, 1888); Murray and Thompson, "Deep Sea Deposits," in *Report on the Scientific Results of the Voyage of H. M. S. Challenger* (London, 1891); Murray and Hjort, *The Depths of the Ocean* (ib., 1912).

O'PAH, or KINGFISH. A beautiful and palatable fish (*Lampris luna*) of the Mariposa family (Lampridæ) and related to the John Dory (q.v.). It abounds in most northern waters, but is rare on the American Atlantic coast. It grows to a length of 4 feet or more, is of oval form (see Colored Plate of GAME FISHES, with TROUT), with a high dorsal fin and a powerful tail. It is brilliantly colored—the upper part of the back and sides rich green, reflecting purple and gold in different lights, the lower parts yellowish green; round yellowish-white spots above and below the lateral line; all the fins bright vermilion. The flesh is much esteemed. This fish has many names, as mariposa, moonfish, and king of the herrings. Consult Hamilton, "British Fishes," in *Naturalist's Library* (London, n. d.).

O'PAL (Fr. *opale*, from Lat. *opalus*, from Gk. *ὀπάλλιος*, *opallios*, opal; connected with Skt. *upala*, stone, upper millstone). A hydrous dioxide of silicon, differing from quartz by a variable proportion of water which it contains, the quantity of which varies from 2 to 13 per cent and even more. It occurs usually in pale shades of yellow, red, green, and blue, although sometimes the color is quite dark, the coloration depending on different oxides and frequently showing a brilliant play in the light. Opal is never found crystallized and has a conchoidal fracture, being easily broken. Among the ancients this mineral was held precious and regarded as a lucky stone. In the East the opal is believed to make its wearer beloved of God and man so long as he trusts sincerely in its power. The finest opal is said to be among the Austrian crown jewels. It weighs 17 ounces and is 5 inches long by 2½ inches in width. The principal varieties of the opal are: (1) the precious opal, (2) fire opal, (3) girasol, (4) common opal. The precious opal, called also noble opal and sometimes oriental opal, is semitransparent or translucent, usually of a bluish or yellowish-white color, yellow by transmitted light, and exhibits a beautiful play of colors, due to minute fissures which, being filled with air and moisture, reflect all the prismatic colors. This variety is used principally as a gem stone and is polished with a convex surface because its play of color is best shown in that way; but it is never cut into facets, because of its brittleness. The finest specimens are found near Kaschau in

Hungary, where they occur disseminated in the conglomerate; this variety is also found in Saxony, Honduras, South America, Queensland and New South Wales in Australia, and especially near Querétaro in Mexico; and also in Oregon and Washington in the United States. The fire opal, which is of a hyacinth-red color, with yellow and green reflections, occurs at Simapan in Mexico, and also in Honduras. The girasol, which is bluish white in color with reddish reflections in a bright light, occurs chiefly in Mexico and Central America. The common opal is semitransparent and may be watery white, yellow, green, red, or brown; it exhibits no play of colors. It is found in Hungary, in various localities in Germany, in Cornwall, Pa., Idaho Springs, Colo., in Calaveras Co., Cal., and elsewhere. Wood opal is petrified wood showing the original form and structure. Hyalite, or Müller's glass, is a colorless or whitish variety of opal, while menilite is an opaque grayish variety which is frequently found in concretionary form. See Gems; Girasol.

OPATA, ō-pä′tȧ (enemies; so called by the Pima, with whom they were anciently at war). An important tribe of Piman stock occupying the mountainous region on the headwaters of the Yaqui River in Sonora and the adjacent portions of Chihuahua, Mexico. When first known to the Spaniards they were found occupying settled villages of adobe huts and cultivating fields of corn and other vegetables. They are brave and faithful, for which reason they have been extensively employed by the Spanish and Mexican governments as soldiers and frontier guards. In 1820, owing to neglect and abuse from Mexican army officers under whom they served, their warriors revolted. Under their chiefs, Doraine and Espíritu, they defeated several expeditions sent against them, making a final stand in an adobe church against a force of 2000 Mexican troops until their ammunition was exhausted, when they were obliged to surrender. The two leaders and 17 others were shot, but the abuses of which they complained were corrected, and they have since remained quiet and loyal. They number now about 5000. See Piman Stock.

OPDYCKE, ŏp′dīk, Emerson (1830–84). An American soldier, born in Hubbard, Trumbull Co., Ohio. In July, 1861, he enlisted as first lieutenant in the Forty-first Ohio Volunteers and was soon afterward promoted to be captain. In January, 1863, he became colonel of the 125th Ohio. At Chickamauga his regiment lost one-third of its number; at Missionary Ridge his command was one of the first to reach the Confederate works; and at Franklin (q.v.) a timely charge of his brigade by his orders restored the Federal line broken by Cleburne's charge and prevented what might otherwise have been a great disaster. He was made brigadier general of volunteers in 1865 and in 1866 was brevetted major general of volunteers to date from the battle of Franklin. After his resignation, in 1866, he entered business in New York City.

O′PECHANCA′NO. A chief of the Powhatan Indian confederacy of Virginia, succeeding the famous Powhatan, who died in 1618. He acted as mediator in preventing hostilities in consequence of the abduction of Pocahontas by the English in 1613, but on his succession to authority soon gave indication of settled dislike to the whites. Under cover of professions of friendship he united nearly all the tribes of tidewater Virginia into a conspiracy against the English, and on March 22, 1622, a simultaneous attack was made on all the scattered settlements, resulting in the massacre of 347 men, women, and children, or more than one-fourth of the whole white population of the Colony. Jamestown alone escaped, through the timely warning of a friendly Indian. The war thus begun continued until both sides were exhausted, when a peace was made which endured for over 20 years. As the English settlements advanced the Indians were steadily pressed back from their old-time fields and fishing grounds until in 1644 Opechancano, now grown old and nearly blind, determined to make a last stand for his people. In another concerted attack along the frontier 300 English settlers perished. By this time, however, the whites had greatly increased in number, while the Indians had correspondingly diminished. A war of extermination was ordered and kept up for two years, the Indians being hunted down like wild beasts, without rest or quarter. In 1646 it was brought to an end by the capture of Opechancano by an expedition led by Governor Berkeley in person. The chief was taken to Jamestown, where he was soon afterward shot and killed by the sentry appointed to guard him.

OPELIKA, ŏp′ē-lī′kȧ. A city and the county seat of Lee Co., Ala., 29 miles northwest of Columbus, Ga., on the Western of Alabama and the Central of Georgia railroads (Map: Alabama, D 3). It is an important cotton market, owing to its location in a productive cotton region, for which it is also a distributing centre. There are cotton gins, compress, and mills, cottonseed-oil mills, fertilizer works, brick plants, etc. Opelika, settled about 1840, is governed, under a charter of 1899, by a mayor, elected biennially, and a council. The water works and electric-light plant are owned by the city. Pop., 1900, 4245; 1910, 4734.

OPELOUSAS, ŏp′ē-lōō′*sas*. A town and the parish seat of St. Landry Parish, La., 143 miles by rail west by north of New Orleans, on the Bayou Teche and on the New Orleans, Texas, and Mexico, Morgan's Louisiana and Texas, and the Texas and Pacific railroads (Map: Louisiana, E 5). Opelousas has the academy and convent of the Immaculate Conception, and a free reference library is connected with the high school. There are a cotton compress, cottonseed-oil and rice mills, and other industrial establishments. The municipality owns the water works and electric-light and sewerage plants. Pop., 1900, 2951; 1910, 4623.

OPENBILL. Either of two species of East Indian and African storks of the genus *Anastomus*, remarkable for the structure of the bill, the mandibles being in contact only at the base and tip, with a wide interval between their edges for some distance near the tip. It was formerly thought that this opening was caused by the friction of their food on the bill, but it has been discovered that the young birds also possess this peculiarity. They frequent the seacoast and rivers and feed chiefly on mollusks, and from this fact derive the name of shell storks. They nest among the reeds in marshes and in trees, returning year after year to the same site.

OPEN CHURCH. See Institutional Church.

OPEN DOOR. A term in international politics which came into general use in 1899 and had reference to the equality of commercial opportunity in China to all nations. The enunciation of the open-door policy had its origin in the acquisition by various European Powers of commercial ports in China and the insistence of the United States that such ports should be open to all the world on equal terms. The term has since been applied generally to the colonial policy which guarantees equality of treatment by the colonizing nation and foreign nations. The open-door policy is followed by the several nations on the west coast of Africa, and the French are pledged to this policy in Morocco.

OPEN-FIELD (or COMMON-FIELD) **SYSTEM.** The term used to designate the scheme of agriculture which prevailed in England and other countries during the mediæval period. At this time the rural population was grouped together in villages, either free or manorial, in which every man had his house with a small plot of ground about it, while around the village lay the plowed fields, the meadows, pastures, and forests. The arable land was that to which the term under discussion is applied. It was divided as nearly as possible into three—or some multiple of three—equal fields, in each of which every man in the village had a certain share. The system had two distinctive features. In the first place, a man's holding in each field did not consist of one compact plot of ground, but was made up of several strips, each about an acre in size. Narrow strips of grass were the only boundary lines; hence the name open field. The second feature of the system was the rotation of crops. Every third year one of the fields was left to lie fallow. What crop it should bear the other two years was also regulated by custom. Survivals of the open-field system are present in English agricultural life to-day; in fact, during the nineteenth century more open fields were inclosed than had ever been inclosed in a like period before.

OPEN-HEARTH PROCESS. See IRON AND STEEL, METALLURGY OF.

OPEN, SESAME, sĕs'*a*-mē. In the story of Ali Baba in the *Arabian Nights*, the magic formula which opens the door of the thieves' cave.

OPEN SHOP. See CLOSED SHOP.

OPEN-TIMBER. A term applied to certain kinds of roof. See ROOF; also HAMMER BEAM.

OPEN TONES. See NATURAL TONES.

OPEQUON (ō-pĕk'ŏn) **CREEK,** BATTLE OF. See WINCHESTER.

OP'ERA (It., composition, from Lat. *opera*, work; connected with *opus*, Skt. *apas*, work). A musical form of stage play. The Athenian drama was grandparent to the opera. When that artistic reform, the Renaissance, swept Italy it stamped its influence on each one of the fine arts; it was a universal harking back to the period of the classics. The arts that had idled along through the Middle Ages were reanimated with the breath of classicism; but music alone was an exception to the rest. It was the youngest of the arts and differed by nature from the others in that it was not imitative. While its development was steady from about the tenth century on, this progress was almost entirely free from the influences of ancient models and on lines dictated by evolution itself. One of the prevailing symptoms of the Italian Renaissance was complete dissatisfaction with art as it stood. It was easy enough to reconstruct the ideals of the other arts: there were tangible models to imitate, but none of these served the cause of music. Out of the hazy past came confusing echoes of the Greek drama, a combination of poetry, music, and the dance, and this was adopted as the ideal plan upon which to reconstruct music. Their choice seemed logical enough to the crew of reformers who went to Greece for most of their formulæ; but when it is considered that they knew little of the actual use to which music was put during those days of Athenian art, it must appear as a step in the dark. Remarkably enough, it was a step in the right direction, a step which, modernized and made practicable, afterward led opera out of a discouraging tangle of half-hearted theories and ill-assorted experiments to a point of artistic culmination.

Previous to the real beginnings of opera there were plays to which in one manner and another music was linked. There were costumes, scenery, and action—all these displayed on a stage—and the trend was sometimes dramatically or sentimentally pastoral, frequently comic. Adam de la Halle (c.1235–1287) composed a dramatic pastoral called *Le Jeu de Robin et de Marion* for the French court at Naples, produced there about 1285, which has been mistaken for the actual starting of opera. In reality it was nothing more than a string of ballads, popular in that day, joined by a dialogue; and as Halle wrote only the latter, his fame as a composer is almost erased. There were many other efforts of this kind, none of which had a direct influence on the opera of the future. The plight of the serious composer striving then for a vehicle of dramatic utterance was pitiable. The folk song or ballad could not be taken seriously by him as it stood: all his training had taught him to honor only the complex art of polyphonic writing, which is melody multiplied, in which the different voices interwove and crossed each other. He might—and did—take folk song as material about which to weave his counterpoint. This bred new troubles, since such a procedure could not endure the test of dramatic action: several voices singing in counterpoint scarcely could be made to stand for the dramatic utterance of a single person. So he dared such experiments only in the unexacting domain of the concert room. Another claim for attention comes from the ballet of that period, especially in France. Besides the grandeur of the scale on which these entertainments were carried out, the plots were sufficiently important dramatically to cause some historians to believe this the beginning of opera. We, from our point of vantage, can see now the theoretical errors of all these attempts; but they were seen long ago by a band of enthusiasts.

Towards the end of the sixteenth century there assembled a number of Florentine noblemen determined to free dramatic music from its trammels. They have gone down in history as La Camerata, and the circle was composed of Bardi, Strozzi, Galilei, father of the famous astronomer, and Corsi. With these amateurs there consorted Ottavio Rinuccini, a poet, and the musician Jacopo Peri (1561–1633). In pursuing their Hellenic ideal of reconstructing music upon the principles of the Greek drama they ignored all the contrapuntal advance music had made during four centuries. The only task they set before themselves was to express in sounds the sentiments of the poet; and music as an independent art was discovered. What latitude this gave composers is easy to imagine; it also freed the voice so that it could work singly with an orchestral accompaniment. In a word, it was the first known attempt of merging the word and the sound into an individual whole. Theories grew into actuality when a performance of *Dafne* was celebrated at the Palace of Corsi in 1594. The libretto of this, the first opera, was by Rinuccini and the music by Peri; and it was written according to the formulæ of the Camerata in the *stile rappresentativo*, the expressive style. *Dafne* was successfully performed several times, but always in private, and now the score is not discoverable. The public was initiated five years later when two settings of Rinuccini's *Eurydice* were made, one by Peri and the other by Caccini. Both operas were produced in part during the marriage celebration of Henry IV and Maria de' Medici at the Pitti Palace, Oct. 6, 1600. These two operas embody the tentative strivings of the Florentine Camerata in their efforts to revive the drama of the Greeks. Measuring the accomplished thing by the ideal model the former must appear ridiculous and very wide of the mark. But here at least was a step in an untrodden path. Opera was now on a basis which admitted of development. Its career had begun.

THE INFLUENCE OF ITALIAN OPERA

How ripe Italy was for the music reform begun at Florence is proved by the eagerness with which other composers took up and utilized the Camerata's ideas. Fortunately for the fate of opera some great musicians interested themselves in it; musicians who were bolder even than the brave spirits that had launched it. First among these was Claudio Monteverde (1567–1643), by the nature of things a pioneer. Several innovations are laid at his door, the most important to the development of opera being the breath of life he put into the ligneous recitatives of Peri and Caccini. This meant the bursting of another bond which had restrained dramatic freedom, and dramatic melody replaced the stilted recitatives. He was aided in these reforms by his contemporary Marco da Gagliano. When Monteverde's first opera, *Orfeo*, appeared in 1607 and his second one, *Arianna*, a year later, synchronous with Da Gagliano's *Dafne*, it was evident that Peri and his comrade had been left far in the rear. The individuality of the later composers asserted itself and in a short space of time opera had made a great bound for freedom. Of the three following decades few records remain to prove any great advance along the line of reform, a surprisingly large number of scores having been destroyed. But opera made a great advance in 1637 when the Teatro di San Cassiano, the first public opera house, was opened in Venice. Now that the masses had a voice in the matter, it soon became evident that the people must be pleased and the Florentine ideals forgotten. The nobleness of the libretti deteriorated, mythology gave way to history, and melodrama was king. The masses were pleased, and the business of opera flourished until there were 11 opera houses in Venice alone. The leading musical spirit of this Venetian opera period was Monteverde's pupil, Pietro Francesco Caletti-Bruni (c.1600–1676), who adopted the name of his noble patron, Cavalli. He was an excellent musician and did much to give Venice opera local color by introducing the spirit of jest in his works; he is even credited with the invention of the operatic aria, distinct from the *musica parlante* used by his predecessor. (See ARIA.) But the introduction of the aria was a disastrous move for the good of opera; it boded degeneration of serious opera and paved the way for the *opera buffa*. The same fate was threatening Neapolitan opera, despite the composer genius Francesco Provenzale (c.1610–?), when a new force stayed the decline of opera. The contemporary composers who had not troubled themselves about the stage had gone quietly about their business developing the other forms of music in which they were unhampered by scenic bounds. It stands to reason that their art was a purer one; so when one of these, Marc' Antonio Cesti (c.1620–69), pupil of the celebrated Carissimi, came to Venice at the middle of the seventeenth century he brought with him a remarkable technique and many musical ideas. That the latter were for the most part badly suited to the demands of opera is true, but he made his mark on the map of operatic history by ousting the comic element from serious opera. Hereafter *opera seria* and *opera buffa* traveled different roads. The latter tumbled mightily from grace at first, but gradually its cause was championed by Nicolò Logroscino (c.1700–63), Pergolesi (1710–36), and Piccini (1728–1800), who reëstablished it on an artistic basis. Under the above-mentioned Cesti serious opera fared very badly. His intentions doubtless were good, but his training under Carissimi was all antagonistic to the principles of opera. He tried to reconcile opera and oratorio and what resulted was neither. The product was some unfortunate thing that had fallen between the two stools; opera became undramatic and unscenic—in a word, it became unoperatic.

Even so great a musician as Alessandro Scarlatti (1659–1725) could not rescue opera from its plight. His one striving was to develop the musical end of the form, and in his eagerness he neglected the dramatic entirely, just as so many other composers had done and were doing. This wretched period, which has been called the oratorio epoch of opera, lasted until the stern Gluck reform set in. Italy had been too small to hold the effects of the Florentine movement, and Dresden produced a German version of *Dafne* about 1627. The composer was Heinrich Schütz, who had been trained in Venice under Gabrieli, whose work was an imitation of the Italian. Nuremberg cropped up with something which purported to be more Teutonic later. This was a lyric drama called *Seelewig*, by Staden (1607–55), which proved, after all, to have little of the national in it. It was evident that Germany could not get on without Italy in matters musical, so it was no surprise to find a wholesale importation of Italian composers, operas, and opera troupes into Germany about the middle of the seventeenth century. Nevertheless by 1678 Hamburg had a German opera house. The opening performances were mere farces of serious work and the scheme was too ridiculous to last. A betterment came in 1697 when Reinhard Keiser (1674–1739) produced his *Ismene;* from then until 1734 he was actively connected with the opera. He worked diligently to divorce opera from Italian influences and wrote German music; but unfortunately he planned his work in the forms of the Neapolitan oratorio-opera, which had no artistic excuse for existence at all. So far opera made in Germany was not a success, and with Keiser's death Italy again flooded the country with its musical product. The Italians also forced their way into France. Their early performances there may be passed over, being of no great importance in themselves; but they awakened in the Frenchman's mind the possibility of a national opera. This culminated with the accession of Louis XIV to the throne, for he bestowed on Pierre Perrin (1620–75) the right to found an academy of music. A company was incorporated, and on Aug. 19, 1671, the Académie Royale de Musique, which still exists, began its career with *Pomone*, a mediocre pastoral, the music by Cambert (1628–77). So here was the Italian influence dominant in France and resulting in the founding of an institution in imitation of the Florentine Camerata. Although Perrin and Cambert founded the Académie Royale de Musique, their activity at its head was short-lived. The father of French opera is Lully (1633–87). Giovanni Battista Lully, a Florentine by birth, was taken to France and began his Parisian career as a scullion. His violin playing, however, drew attention to him, and under noble patronage he began the study of music. As a musician he acquired dignity, knowledge, and power; he intrigued against Perrin and Cambert, and in short order was the head of the Académie. Here he ruled with a high hand, but his extraordinary and numerous talents made him a valuable person. He composed a large number of ballets, divertissements, and operas, in all of them pandering to the local taste and keeping the dramatic element well forward. Naturally his operas betray Italian influence, but this is neatly modified or cleverly disguised; above all they are adapted to the stage. His principal successor—and this after a lapse of time—was Jean Philippe Rameau (1683–1764), who was a better musician, but had not so keen an eye for the dramatic end of opera, and under his reign Italian opera once again secured a hold in France. It must be recorded to the glory of French pride that the Italians did not succeed, as in Germany, in overwhelming national opera; but the taste of the musical public was divided and afterward, as we shall see, culminated in the Gluck-Piccini contest for operatic honors.

In England opera had tentative beginnings as in every other country; here it was the masque (q.v.) that gave early excuses for the employment of music with stage productions. But this form was no nearer opera than the gorgeous French ballet had been and it founded no school. It remained for Henry Purcell (1658–95) to lay the corner stone of English opera. He was probably the greatest of England's musicians—certainly the last of the great ones—and was a pupil of Pelham Humfrey, who in turn had studied under Lully. Much of his work consists in musical settings for plays, but there is at least one real opera, *Dido and Æneas*. The early death of Purcell was particularly unfortunate for England, inasmuch as there was no one to succeed him; and as art cannot remain stationary, it declined. This was the usual opportunity for Italy, whose musical scouts were constantly surveying the operatic field for fresh conquests. The most important of the invaders, however, was the German George Frederick Handel (1685–1759), who had become thoroughly Italianized. He wrote and produced opera after opera until he became bankrupt, and then he turned out oratorios with equal facility. That he had dramatic ability, other than a musical one, is extremely doubtful, and his operas belong unquestionably to that dread oratorio-opera style inaugurated by Carissimi through Cesti. Handel did not have the English field to himself; his rivals were Buononcini (c.1660–c.1750) and Ariosti (1666–c.1740). The stringing of ballads, as Dr. Pepusch (1667–1752) did in the case of John Gay's *The Beggars' Opera*, does not deserve serious consideration in itself, but in England it gave rise to the school of ballad opera from which nearly all later attempts at English opera sprang. How widespread the influence of Italian opera was has been shown; also that it was the kernel of national opera in England, France, and Germany. Even a cursory glance into the matter will prove that in the haste to cover all available territory and in the eagerness to please the several masses the Florentine ideals were buried under the numberless mounds of failure which opera had left in its trail of popularity. A reform was imminent.

GLUCK, THE REFORMER, AND MOZART, THE MELODIST

Christoph Willibald Gluck (1714–87) was a dissenter from the very start. His musical training had been principally in the Italian school, but he realized many of its operatic insipidities and had determined even with his first work to cut loose from some of the foolish conventions into which opera had drifted. At first he aimed to give importance to the dramatic in the libretto by means of music—something which had been overlooked by the composers of ornamental opera for decades. This experiment was tried with *Artaserse*, which, oddly enough, came on the boards the same year that Handel's final opera appeared. It would be silly to contend that Gluck had found himself straightway in his first opera; no composer has done that yet. In fact, he seems simply to have defied convention, with no rules of his own save just this one of defiance. Now, no system can grow on such a basis, and after writing several operas and traveling about, he began to lose interest in his work. He had met convention at every turn, and this constant attitude of fight on his own part wore him out. Eventually he conferred with an Italian poet, Calzabigi, and the two decided that the trouble of the entire operatic situation was that the prima donna had grown too vain and important—she dictated to the composer—and that the libretto of the day was lacking in dramatic element. This happened when Gluck was already 46 years old, and certainly the weaknesses which he and the poet unearthed must have been known to both of them long before. But what followed was important. Calzabigi wrote a libretto on entirely new lines, and Gluck set it sincerely to music. This was *Orfeo ed Euridice*, brought out in 1762, the first attempt not only to forsake the oratorio school of opera, but also to formulate a new plan by which opera might claim attention as an art form. Of course the public complained; but after a while the intelligent ones among them realized the earnestness of both poet and musician and were won over. The next opera from these pens, *Alceste*, was an improvement on the previous one, as was *Paride ed Elena*. Gluck now attracted the attention of the French poet Du Rollet, connected with the French Embassy at Vienna, and the two set to work to make an opera out of Racine's *Iphigénie en Aulide*. Then Gluck longed for a Paris success, and through the influence of Marie Antoinette succeeded in securing an invitation to that city. His patron also succeeded in precipitating the innocent composer into a political quarrel by antagonizing Madame Du Barry. However, Gluck's *Iphigénie* achieved a hearing and afterward a success in Paris. In the wake of this came one of the bitterest fights in all operatic history. At the bottom of it politics raged, but on the surface it seemed a controversy over æsthetic ideals. It culminated by forming two violently antagonistic parties which pitted Gluck on the one hand against Piccini on the other. Many prominent persons took active share in the conflict, which was almost an international affair, since the outcome would control the fate of Italian opera. The two composers were dueling with operas. Gluck composed *Armide*, and against that Piccini wrote *Roland*. So matters might have gone on indefinitely had it not been decided that both of them should set the same subject to music. This was *Iphigénie en Tauride*, and Gluck triumphed because of the superiority of his work. So dramatic verity and operatic sincerity won the day. The principles upon which Gluck had insisted and for which he had waged successful war were really only those formulated by the Florentine Camerata almost two centuries earlier. It was a tribute to the Florentine noblemen, though probably they builded better than they knew.

At this period the influence of Mozart (1756-91), the genius of melody, began to make itself felt. Except that he had a keen appreciation for the dramatic, he was the antithesis of Gluck. He had no regard for the precepts of his planning predecessor; those formulæ over which Gluck had slaved meant nothing to him, and he succeeded by virtue of sheer genius. He composed with the greatest ease and rapidity, and wrote masterpieces with less care than other composers devote to writing trash. Yet his *Don Giovanni* is one of the greatest of the older operas. He individualized his characters musically, was alive to dramatic situations, and inclosed the whole in a network of pure melody, perhaps the most exquisite ever produced. It was more Italian than the sunny, melodious product of that country, but it was controlled by a genius which shone through at every bar. When he wrote in the vein amusing, as in *Le Nozze di Figaro*, it made the efforts of the Italians, who created this genre, sound flimsy and trivial. When he grew serious, as in the gruesome scenes of *Don Giovanni*, he foreshadowed the Wagner music drama. Yet with all these attributes Mozart himself did not change the current of the operatic stream nor did he found a school of successors. Nowhere in the history of opera is there a parallel to his case.

THE ITALIANS AND THE FRENCH

While supplying the world with operas and composers Italy grew careless of her product. Too great a prosperity usually breeds decadence, and the business of music is no exception; besides, the Italians were exporting their music and importing none. The fertility of every nation has an end. Soon poverty threatened musical Italy, though she produced some remarkable men. Domenico Cimarosa (1749-1801) was unfortunate in that he was followed by Rossini (1792-1868), whose operas soon displaced those of his less gifted predecessor. Rossini had the fertile gift of melody, but lacked the ambition to develop his gifts. He wrote melody and let the action look out for itself. This was a distinct step backward to the ante-Gluck period, and it is remarkable to note how rapidly the vices of the old Italian school sprang into life again and throve. The flourish became the thing; the singer's agility was a virtue; the ear was tickled and the eye insulted. In lighter opera this did not matter so much, and Rossini left the world at least one masterpiece and a model in this form, *Il Barbiere di Siviglia*. His successor, Giovanni Pacini (1796-1867), tried to stem the flippant tendency which crept into opera, but in this work he was overshadowed by both Gaetano Donizetti (1797-1848) and Vincenzo Bellini (1801-35), who slaved for the dramatic in opera. They achieved it, all the while flattering the public with the flourish to which Rossini had accustomed it. Save for a very few operas, such as *Don Pasquale*, *Lucia di Lammermoor*, and *Norma*, their names have disappeared from the roster of opera houses to-day. They led the way to Verdi, however. He, on account of the masterly works of his last period, will be treated later. In France the Gluck theories of opera had been driven home so sensationally that they were not dislodged in a hurry. After Gluck's death the work was carried on by his pupils, Antonio Salieri (1750-1825) and Sacchini (1734-86), who kept alive his master's ideas without accomplishing anything remarkable himself. Then come the stately Cherubini (1760-1842) and Gasparo Spontini (1774-1851), who has been called the last classicist of the lyric stage. Soon afterward Auber (1782-1871), who had previously worked for the Opéra Comique, sprang into the arena of grand opera with *La Muette de Portici*, also known as *Masaniello*, and sent Gluck classic traditions flying. This shock was still upon the people when Rossini's *Guillaume Tell* appeared—the most pretentious work attempted by this composer—and then the Romantic period of 1830 possessed the Parisians heart and soul, bringing with it a lordly figure in the history of opera—Giacomo Meyerbeer (1791-1864).

Meyerbeer had a most remarkable genius for adaptation, combined with a shrewd technical mastery and a keen business insight. All these fitted the period, and he was careful to see that they did. By writing what pleased he controlled the operatic situation of France absolutely. His librettist was Scribe, a man of sprawling talent, and the two knew to a beat how quickly the Parisian's pulse throbbed. The success of *Robert le Diable* was simply stupendous, and Meyerbeer held French opera in the palm of his hand. His hold on the public did not relax with his later works, and even the music lover of to-day acknowledges some tremendous moments in *Les Huguenots* and *Le Prophète;* but his last work, *L'Africaine*, betrays the sameness of his methods, though there is a decided advance on the technical side of the orchestra. Meyerbeer was a master of sensational effect; his operas are full of it, and his music is insincere, frequently vulgar. In contrast to this honor-crammed career is the career of Hector Berlioz (1803-69), that strange, willful genius who yielded not a jot to popular likes. His operas are fantastic creations that have never appealed to managers or public; in fact, his huge double work, *Les Troyens*, had to wait until 1893 for its première. He also composed a sprightly musical comedy, *Béatrice et Bénédict*. It is most unlikely that his operas ever will become repertory pieces. When they were written they were considered too much in advance of their time, and now Richard Wagner's music dramas have made them seem old-fashioned.

Jacques Fromenthal Halévy (1799–1862) bridges the gap between Meyerbeer and Charles François Gounod (1818–93), whose *Faust* is probably the most popular of French operas. His later work, of equal pretensions, *Roméo et Juliette*, is marred by its sentimentality. A word should be said about the French opéra comique. Naturally the child of Italian *opera buffa*, in time it gained importance as an art form. Its earlier composers, Philidor (1726–95), Monsigny (1729–1817), Grétry (1741–1813), wrote light, pleasing music. Méhul (1763–1817), who was a pupil of Gluck, introduced some ideas bordering on the serious, as did Boieldieu (1775–1834). Then came Auber and Hérold (1791–1833), who raised the standard considerably. It grew entirely serious when the unique operettas of Offenbach attracted the jocose element to the Opéra Bouffe. The Opéra Comique had branched out before, but Offenbach drew the dividing line plainly. Since then some of the works written for the Opéra Comique differ from those at the Grand Opéra only in that the dialogue in the former is spoken, not sung. Among its serious contributors were Gounod with *Mireille*, Ambroise Thomas with *Mignon*, and Bizet with the masterpiece of them all, *Carmen*. This work is a classic, and where it is performed with sung dialogue rears its head high above some of the more pretentious works of the Grand Opéra school. Among more recent contributors to the repertory of the Opéra Comique are Delibes, Massé, De Joncières, Massenet, Godard, Saint-Saëns, Lalo, Bruneau, D'Indy, and Charpentier. Some of the latter have even done away with the old-time formula of spoken recitative, and now there is little theoretical difference between works produced at the Comique and at the Opéra.

THE GERMANS AND WAGNER

Mozart's early death left Germany without any great opera composers until Ludwig van Beethoven (1770–1827) wrote *Fidelio*. Beethoven was about the last man who might be expected to attack the task of opera writing—all his works had been in the line of absolute music—but finally he selected a surprisingly bad libretto and went to work. *Fidelio* is one of the most curious compositions in the entire literature of opera; it is so full of contradictions. From passages that are nothing short of superb and wonderful it ranges to episodes when the listener feels that the composer is decidedly out of sympathy with his subject and the art form. As a whole, despite the overwhelming "Abscheulicher" air and the superb duo in the second act, it is disappointing, and even admitting all greatness possible, it is at best scarcely an opera. The next important figure is Louis Spohr (1784–1859), whose operas marked the beginning of German romanticism, followed closely by Weber (1786–1826), whose works show this movement in full bloom. Weber's principal opera, *Der Freischütz*, is still in the repertoire and apt to remain so for a long time to come, since the music displays a buoyancy and richness of sentiment that are remarkable. He is by far the most German of all opera composers, Wagner not excepted, and seems to have embodied in his music many of the national characteristics. In the wake of Weber came a string of opera composers who have been designated depreciatingly as the writers of kapellmeister music. The list is too long and unimportant to repeat; but there were a few others who rose distinctly above this level and really produced some good work. First among these is Heinrich Marschner (1795–1861), some of whose operas are still produced in Germany; the same is the case with Albert Lortzing (1803–51). Peter Cornelius (1824–74) left at least, thanks to the kindness of Liszt, one opera, the *Barbier von Bagdad*, which has survived its critics. Incidental mention may be made of musical works with spoken dialogue—Singspiele they were called—among which Otto Nicolai's (1810–49) *Die lustigen Weiber von Windsor* is a charming example. But the operatic list might be prolonged indefinitely—it includes the names of Schubert, Mendelssohn, Liszt, and Schumann—and at the end it would be found that none of them affected the history of opera sufficiently to be worthy of mention. Besides, interest in this period centres in the greatest figure in the whole history of opera, Richard Wagner (1813–83).

Wagner's musical development is one of the most remarkable on record. Passing over two youthful works, *Die Feen* and *Das Liebesverbot*, which are of historical interest only, his career as opera composer began with *Rienzi*, a work designed for the Paris Grand Opéra. Successful as this was, Wagner must have realized that the old form was a bar to any progress, and he turned his back on it for all time. With his next opera, *The Flying Dutchman*, he works along the lines laid down by Weber, but his own individuality was so marked that the result is not at all Weberish. After this he takes a tremendous leap forward and lands with *Tannhäuser*, again a tentative move; then with another effort he achieves *Lohengrin*. No other case in music history comes to mind where three moves cover so great an advancement as those from *Rienzi* to *Lohengrin*. Now followed the period of his political exile, which gave him liberal opportunities to ponder the problem of music drama. During these broodings he saw that opera was going the wrong way. The set forms of aria, recitative, of chorus, and orchestral accompaniments and interludes, must be abolished. He thought and wrote out the problem, arriving at the idea that the one possible salvation of this art form lay in abandoning all the excrescences of the later Italian, the Neapolitan school, and going back to the original principles of the Florentine Camerata. Upon these he experimented until he had formulated his basis for a music drama with its logical development of the leitmotiv (q.v.), or leading motive, and its welding into a great synthesis, song, action, and orchestra. Not only did he theorize, but he composed his tetralogy, *Der Ring des Nibelungen*, of which *Das Rheingold* was the first part. One vital point must be made here: that in every case Wagner was his own librettist. This was the first active rebellion against the puerile stuff furnished by poets for musical setting. *Rheingold* was followed by the second part, *Die Walküre*, and that by *Siegfried*. Poverty and troubles of exile compelled an interruption, during which time *Tristan und Isolde* and *Die Meistersinger von Nürnberg* were composed in hopes of having them produced—a thing which did not seem at all likely to happen to the *Ring*. Eventually he secured the patronage of King Louis II of Bavaria and finished *Siegfried*, together with the final part, *Götterdämmerung*. Then followed the planning and contriving to have an opera house built in which he could produce this great tetralogy, and after a long fight Bayreuth was selected and the theatre constructed. He closed his life's work by writing *Parsifal*, soon after the first performance of which he died. No other composer ever planned and successfully carried out such sweeping reforms; none other ever held out so obstinately for dramatic verity. He came nearer than any one else to merging the word and its meaning into the sound musical, and his technical mastery allowed him to do just that which he started out to do, though in the last analysis Wagner the musician triumphs over the theorist Wagner. It is perhaps not just to speak of Wagner's work as an operatic reform; he did more than this, since he demolished opera as he found it—a mere string of idle tunes strung on silly words—and constructed it anew, with a few shadowy precedents to guide him. His versatility is shown by the range of poetic subjects he handled—each one in such a manner that his music seems the only possible expression of that particular subject. His *Ring* more nearly approaches the magnitude of the Greek drama than anything else in modern times; and in *Tristan* he has on the simplest action achieved a musical drama that stands as a granitic block. His influence was and is tremendous; probably no composer of opera since has been able to escape it; either he has imitated or he has rejected Wagner—in both cases the influence is traceable.

MODERN TENDENCIES

Italy. Far above all the dramatic composers of Italy during the nineteenth century towers Giuseppe Verdi (1813–1901). He began his career when Italy was still absorbing the melodic treacle that flowed from the pens of Donizetti and Bellini, and he closed it two decades after Richard Wagner died. He was a most prolific writer and a progressive one. His early works were of the approved style of the period; then came a spell during which he wrote what still remain popular works, *Rigoletto*, *Il Trovatore*, and *La Traviata*, and then he matured into such a work as *Aïda*, a vast improvement on all its predecessors. By this time he had acquired a certain amount of dramatic freedom which was most valuable, added to the skill with which he wrote for the voice. After the revolutionary period in opera, the period when Wagner was alive and during much of which Verdi lived in silence, the aged Italian came forward anew with *Otello*, considered by some critics his greatest work and certainly among the great operas. From Wagner he had learned the importance of being musically sincere to one's text at all hazards; and either by chance or fate he was blessed with one of the best operatic texts written, compiled from Shakespeare by Boito. *Otello* is an astounding work in many ways. It is lyric—Verdi apotheosized the voice—and forcefully dramatic; as a whole it is satisfying, in parts tremendous. Still later in life he brought forth *Falstaff*, a work so vital with youthful vigor that every page of it denies the number of years then piled on Verdi's head. With this he concluded his career.

Very near Verdi—his friend and the librettist of the later works—stands Arrigo Boito (1842–) with his only but very important opera, *Mefistofele*. Although written almost 20 years before *Otello*, it anticipates the style of that work. A follower of Verdi was Amilcare Ponchielli (1834–86), whose fame lives in *La Gioconda*. Of secondary importance are Marchetti (1835–1902), Faccio (1840–91), and Catalani (1854–93). The enormous success of Mascagni's *Cavalleria Rusticana* and Leoncavallo's *Pagliacci* ushered in the modern veritist school, whose most important representative is Puccini. His *Bohème*, *Manon Lescaut*, and *Madama Butterfly* are likely to hold the stage for some time to come. All the veritist composers show a decided preference for horrible, gruesome, and, not rarely, even indecent subjects, and their music is generally brutal. Of some importance are Giordano, Cilea, Alfano; while Montemezzi seems destined to play a leading rôle in the near future. Strange to say, the founders of the school, Mascagni and Leoncavallo, have sunk into utter insignificance. Not one of all their later works has scored even a mediocre success.

Modern Germany. Germany is still subject to the Wagner influences, as evidenced by the works of Bungert, D'Albert, Goldmark, Schillings, Siegfried Wagner, Weingartner, Kienzl, Pfitzner, and a host of others. Their efforts in the field of serious and tragic opera almost offer proof that Wagner's form of the music drama cannot be successfully employed save, possibly, by a genius of the first rank. Besides the influence of Wagner that of the Italian veritist school is also quite noticeable, especially in D'Albert's *Tiefland*. The only genuine successes that can be recorded are in the fields of the fairy opera and the comic opera. In the former Humperdinck achieved real success with his *Hänsel und Gretel* and *Königskinder;* in the latter D'Albert with his *Abreise* and Blech with *Versiegelt*. Undoubtedly the foremost composer of comic opera is Wolf-Ferrari, whose *Neugierige Frauen*, *Susannes Geheimniss*, and *Der Liebhaber als Arzt* may be regarded as a happy revival of the older Italian *opera buffa*. For a time it seemed as if Richard Strauss were destined to inaugurate a new era of German opera, when *Salome* and *Elektra* achieved sensational triumphs, but the bubble burst almost immediately. His only genuine success Strauss won with *Der Rosenkavalier*, and that is a true comic opera. The lighter field of the operetta must not be ignored, since out of the vast number of works of this kind several, by virtue of sheer merit, maintained themselves for a considerable time after the death of their composers. Suppé (1819–95) still lives with *Fatinitza* and *Boccaccio*, Johann Strauss (1825–99) with *Die Fledermaus*, Millöcker (1842–99) with *Der Bettelstudent*. Among the most successful operetta composers of the present day are Lehar, Fall, Eysler.

Modern France. The influence of Wagner on French dramatic composers has always been a negligible quantity, but all the more evident is the influence of the Italian veritist school. The only composer who did not yield to this influence, but steadfastly followed the ideals of the classic style, is Reyer (1823–1909), whose *Salammbô* and *Sigurd* are still heard in France. Saint-Saëns (1835–) has written but one opera that seems likely to survive him, *Samson et Dalilah*. During his life the operas of Massenet (1842–1912) enjoyed immense popularity, but their monotony of style, the saccharine sweetness of their melodies, and the absence of real dramatic climaxes soon pall. The only composer that shows striking originality and absolute independence is Debussy (1862–) in *Pelléas et Mélisande*. His influence upon French music is tremendous, and noticeable not only in the operatic but also in the instrumental composers of almost every nation, more especially those of Spain, England, and the United States. Even now it seems almost certain that this influence will not last, for Debussy's art ignores completely the vast achievements of Bach, Beethoven, Chopin, and Wagner, and begins anew upon the basis of the Church modes, which long ago were abandoned when music demanded greater freedom and intensity of expression. The dramatic composers who at the present day are under the strong double influence of Debussy's impressionism and Italian veritism are D'Indy, Leroux, Bruneau, Charpentier, Messager, Dukas, Nouguès.

Russia. The master with whom Russian national opera began is Glinka (1804–57), whose *Life for the Tsar* and *Ruslam and Ludmilla* are still in the repertory of every Russian opera house. While Glinka's genius leaned more towards lyrical expression, Dargomyzhsky (1813–69) followed successfully in the path of nationalism, but emphasized the dramatic and declamatory element in *Russalka*. In *The Stone Guest* this striving for utmost dramatic truth caused him to sacrifice much of the musical beauty. Nevertheless this work to this very day has exercised a strong influence upon most operatic composers of Russia. Serov (1820–71) and Rubinstein (1829–94) attempted to stem the rising tide of nationalism and wrote in an idiom influenced by Germany, but without success; so that their operas soon disappeared without having contributed anything to the development of Russian operatic music. Mussorgski (1835–81) followed Dargomyzhsky rather than Glinka in placing dramatic truth before everything, without, however, sacrificing the music to the text. He wrote two powerful operas, *Boris Godunov* and *Khovantchina*. On the other hand, Borodin (1834–87) in his *Prince Igor* inclines more to the lyric style of Glinka. While these composers wrote specific national music to typical national subjects, the works of Cui (1835–), though still essentially Russian, begin to show foreign influences. His music is somewhat influenced by Schumann and Chopin, and in his choice of lurid, sensational subjects (*Ratcliff, Le Flibustier, Mam'selle Fifi*) the influence of the Italian veritists is unmistakable. In the operas of Rimski-Korsakov (1844–1908) national opera, so far, may be said to have reached its highest development. In his first work, *Pskovityanka*, the composer began in the extreme declamatory style of *The Stone Guest*, while in *Snegourochka* and *Mlada* he introduces sustained lyric passages without, however, disregarding dramatic truth. In *Sadko* he strikes an even balance between the two styles. Altogether he wrote 15 operas of uneven merit. The fame of Tschaikowsky (1840–93), outside of Russia at least, rests upon his instrumental music rather than upon his operas, of which *Eugen Onegin*, *Mazeppa*, and *Pique Dame* have also found their way beyond Russia. Tschaikowsky's talent inclines far more towards lyric cantilena than towards dramatic declamation. Besides these composers numerous others, some of whom have achieved distinction in the field of instrumental music, have written good operas, but without decided individuality or materially advancing dramatic music. Nearly all these to a greater or less degree betray the influence of Wagner. The more prominent names are Napravnik, Blaramberg, Taneiev, Ippolitov-Ivanov, Arenski, Grechaninov, Rachmaninov. Followers of French impressionism are Rebikov, Vassilenko, Stravinski.

Bohemia, Poland, Hungary. The national Bohemian opera begins with Smetana (1824–84), whose *Bartered Bride* still remains the unrivaled masterpiece of the national opera. *Dalibor*, *The Kiss*, *The Secret*, and *Libussa* are not much inferior. It is much to be regretted that Smetana never found a librettist able to furnish a text worthy of the master's rare dramatic genius, which even his compatriots did not recognize until after his death. Bendl (1838–97) did little to advance national opera, although his first work, *Leila*, raised great expectations. Nor was Dvořák (1841–1904) more successful, although it was his burning ambition to become Bohemia's greatest operatic composer. All his operas, even his best, *Dimitri*, *The Jacobins*, *Russalka*, prove that he was entirely devoid of dramatic instinct. More successful was Sebor (1843–1903), whose *Dahomira* and *Blanka* maintained themselves upon the national stage at least during the composer's lifetime. Fibich (1850–1900) showed Wagnerian influences in his first work, *Blanik*, but sufficient originality to raise hopes for the future. His *Hedy*, *Don Juan*, *Sarka*, and *The Fall of Arcona* are strongly individual, and successfully continue the work so auspiciously begun by Smetana. Kaan-Albést (1852–) contributed two really valuable operas, *The Fugitive* and *Germinal*. The career of Weiss (1862–) is being followed with special interest, as he gives promise of becoming the worthy successor of Fibich. His *Polish Jew*, *The Twins*, and *The Village Musicians* have met with marked favor also outside of his native land.

Of all the Slavonic nations Poland was the first that could boast a national opera. In 1778 *Luck in Misfortune* by Kamiensky (1734–1821) was produced at Warsaw. The enormous success of this work induced the composer to write five more Polish operas, of which *Zoska* was the most striking. Among a number of operas by Elsner (1769–1854) only two, *Leszek* and *King Zokietek*, are of importance. Kurpinski (1785–1857) followed with 26 national works, of which *Jadwiga*, *Kalmora*, and *Marcinowa* achieved more than ordinary success. Dobrzynski (1807–67) contributed *The Filibusters*. With *Halka* Moniuszko (1819–71) far surpassed all his predecessors. This was followed by several other works, of which *Flis*, *The Hunted Castle*, and *Roskiczana* are the most noteworthy. Zelenski (1837–) contributed *Goplana* and *Janek*, Noskowski (1846–1909) *Livia Quintilla* and *Wyrok*, to the national repertory. The emigration of large numbers of the better classes after the loss of Poland's independence seems to have put an end to the successful development of Polish national opera. A few recent attempts, like Moszkowski's *Boabdil* or Paderewski's *Manru*, usually disappeared soon after their initial performance.

The earliest attempts at a national dramatic music in Hungary, such as Ruzicska's *Flight of Bela*, Heinisch's *King Mathias*, and Bartay's *Intrigue* (all produced between 1823 and 1837), can scarcely be dignified by the title opera. The first real Hungarian opera is *Maria of Batory* by Erkel (1810–93), which aroused boundless enthusiasm. This work, however, was surpassed by *Hunyadi Laszló*, and this again by *Bank Bán*. After that Erkel's inspiration declined perceptibly. Doppler (1821–83) turned his talent to lighter subjects and achieved lasting success with *Ilka*, *Wanda*, and *Judith*. In the works of Mihalovich (1842–) strictly national color almost disappears, and his *Wieland der Schmied* (on Wagner's text) and *Hagbarth* and *Signe* are strongly influenced by the Bayreuth master. In *Toldi* and *Eliana* he attempts a return to the national character, with rather doubtful success. Hubay (1858–) surpasses all his predecessors with *The Violin Maker of Cremona*, *The Vagabond*, and *Lavotha's Love*. Among the younger composers Stojanovits (1877–) attracted much attention with his first opera, *The Tiger*. All things considered, Hungarian opera relies for national color more upon the choice of national subjects and the introduction of Magyar melodies than upon the artistic amalgamation of national characteristics with the universal musical language of western Europe.

Spain. Not until the last decade of the nineteenth century did a serious Spanish opera find its way beyond the boundaries of its native land, although throughout the century operatic music was cultivated most assiduously. The principal reason why the world in general knew nothing of this activity was the almost exclusive cultivation of the zarzuela (q.v.), which is too typically national to be readily appreciated by foreigners. The most prominent composers of this form were Gaztambide (1822–70), Arrieta (1823–94), Barbieri (1823–94), and Caballero (1835–1906), the latter of whom wrote no less than 220 zarzuelas. The first, and for a long time only, composer of serious works was Eslava (1807–78), whose *El Solitario*, *Las Treguas de Tolemaida*, and *Pedro el Cruel* are the first national grand operas. The first opera by a Spanish composer to find its way across the Pyrenees is *Los Amantes de Teruel* by Bretón (1850–). His *Raquel* and *Dolores* are also worthy of notice. Chapi (1851–) has contributed two excellent works, *La Gitanella* and *Circe*. Albeniz (1861–1909) has become known through *Pepita Jiménez*. But the most imposing name is that of Pedrell (1841–), who reaches great heights in *El último Abencerraje*, *Quasimodo*, and, above all, in his magnificent trilogy *Los Pireneos*. Among the younger composers Granados y Campiña (1867–) attracted attention with *María del Carmen* and *Goyescas*, while Manén (1883–) won more than ordinary success in Germany with *Acté*.

England. In spite of great earnestness and industry Great Britain so far has not produced a single grand opera for which even a moderate success could be claimed even in its native land. Until the last two decades of the last century, when Wagner's all-pervading influence began to be felt, British operatic composers were completely dominated by Handel and the Italians. Only two, Balfe (1808–70) with *The Bohemian Girl* and Wallace (1814–65) with *Maritana*, maintained themselves for a considerable time in the repertory of the smaller companies. The more serious composers are Barnett (1802–90), Benedict (1804–85), Macfarren (1813–87), Mackenzie (1847–), G. Thomas (1851–92), Stanford (1852–), Cowen (1852–), De Lara (1858–), and E. Smyth (1858–). The later composers exhibit a peculiar mingling of veritism, impressionism, and hypermodernism. Among these the leaders are Delius (1863–), Bantock (1868–), MacCunn (1868–), and Holbrook (1878–). If the labors in the field of serious opera have been utterly fruitless, Sullivan (1842–1900) has produced some operettas which are unsurpassed masterpieces, comparable to the best creations of J. Strauss, Suppé, or Offenbach, and holding out fair promise of maintaining themselves for many years to come. Perhaps the best is *The Mikado*. Not far below must be ranked *Pinafore*, *The Pirates of Penzance*, and *Patience*. His only grand opera, *Ivanhoe*, was soon forgotten, and a recent attempt to resurrect it failed signally. Besides Sullivan only one other composer of operetta, S. Jones (1866–), won a genuine success with *The Geisha*.

United States. In 1845 *Leonora*, the first grand opera by an American composer, W. H. Fry (1813–64), was produced in New York. Ten years later *Rip Van Winkle* by G. Bristow (1825–98) was heard, and after another interval of eight years Fry came out with a second opera, *Notre Dame de Paris*. As none of these works possessed the least merit they disappeared almost as soon as produced, leaving no trace and exerting no influence. During the last decade of the century S. G. Pratt (1846–) had his *Triumph of Columbus* produced in New York and *Zenobia* in Chicago. W. Damrosch (1862–) with his own opera company gave a few performances of his first opera, *The Scarlet Letter*, in 1896, while B. O. Klein (1858–1911) had *Kenilworth* brought out in Hamburg (1895). With the mention of two operas by F. G. Gleason (1848–1903), *Otho Visconti* and *Montezuma*, neither of which has ever been performed, the history of opera in the United States during the nineteenth century is practically exhausted. Since the beginning of the present century the rapidly increasing number of excellent symphony orchestras, with their liberal encouragement of the native productions in the larger instrumental forms, proved a powerful stimulus also in the operatic field. Although opportunity for scenic performances of native works was still lacking, several composers were tempted to try their hand in the dramatic form. L. A. Coerne (1870–) succeeded in having his *Zenobia* produced in Bremen in 1905, and five years later the Royal Opera of Berlin brought out *Poia*, a work on a typical Indian subject by A. Nevin (1871–). Soon after a change in the management of the Metropolitan Opera House of New York, in 1908, the outlook for the American operatic composer suddenly brightened, when the new manager, Mr. Gatti-Casazza (q.v.), announced his policy of producing every season one work by an American composer, and offered a prize of $10,000 for the best opera submitted in a competition. In this effort for encouragement the Metropolitan company also secured the coöperation of the two great operatic companies of Boston and Chicago. Under these favorable conditions the following works were given: in 1910, *The Pipe of Desire* by F. Converse (1871–); in 1911, *Natoma* by V. Herbert (1859–) and *The Sacrifice* by Converse; in 1912, *Mona* (the prize opera) by H. Parker (1863–); in 1913, *Cyrano de Bergerac* by W. Damrosch; in 1914, *Madeleine* by Herbert. Another prize of $10,000, offered by the music committee of the Panama Exposition, was won by H. Parker with *Fairyland*, which was performed at Los Angeles during the exposition in 1915. It only remains to record that none of these operas, which were heard in ideally perfect representations, had any repetitions in subsequent seasons. All are lacking in vitality.

In the field of the operetta V. Herbert was more successful with *The Wizard of the Nile* and *Mademoiselle Modiste*, while R. de Koven (1859–) rose far above the level of mediocrity in *Maid Marian* and *Robin Hood*.

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LIST OF OPERAS

Opera	Composer	First produced
Abencérages, Les	Cherubini	1813
Abimelek	Meyerbeer	1813
Abreise, Die	D'Albert	1898
Abu Hassan	Weber	1811
Achille à Scyros	Cherubini	1804
Acté	Manén	1903
Adriana Lecouvreur	Cilea	1902
Adrien	Méhul	1799
Africaine, L'	Meyerbeer	1865
Agnes von Hohenstaufen	Spontini	1829
Aïda	Verdi	1871
Alceste	Lully	1674
	Gluck	1767
Alchimist, Der	Spohr	1830
Alcidor	Spontini	1825
Alessandro nell' Indie	Gluck	1745
	Jommelli	1757
	Sacchini	1766
	Paisiello	1775
	Cherubini	1784
Alessandro Stradella	Flotow	1844
Alfonso und Estrella	Schubert	1854
Alfred	Arne	1740
Ali Baba	Cherubini	1833
Ali Pascha von Janina	Lortzing	1824
Alruna	Spohr	1808
Amadis de Gaule	Lully	1684
Amant Jaloux, L'	Grétry	1778
Amantes de Teruel, Los	Bretón	1889
Amazones, Les	Méhul	1811
Ambassadrice, L'	Auber	1836
Amica, L'	Mascagni	1905
Amico Fritz, L'	Mascagni	1891
Amore dei Tre Re	Montemezzi	1913
Amore Medico	Wolf-Ferarri	1913
Amphitryon	Grétry	1780
Anacréon	Cherubini	1803
Ancêtre, L'	Saint-Saëns	1906
Andrea Chenier	Giordano	1896
Andromaque	Grétry	1780
Andromeda und Perseus	J. W. Franck	1679
Angélique et Médore	Am. Thomas	1843
Anna Bolena	Donizetti	1831
Antigone	J. A. Hasse	1723
Apollo et Hyacinthus	Mozart	1767
Arabi nelle Gallie, Gli	Pacini	1827
Ariadne auf Naxos	R. Strauss	1912
Ariane	Massenet	1906
Ariane et Barbe Bleue	Dukas	1907
Ariodant	Méhul	1799
Armide	Gluck	1777
Armide et Renaud	Lully	1686
	Cherubini	1782
	Zingarelli	1786
	Rossini	1817
Arminius	Scarlatti	1714
Artaserse	Hasse	1730
	Leo	1740
	Gluck	1741
	Scarlatti	1763
	Piccini	1772
Artaxerxes	Arne	1762
Artemisia	Cimarosa	1801
Artisan, L'	Halévy	1827
Ascanio	Saint-Saëns	1890
Ascanio in Alba	Mozart	1771
Aspasie	Grétry	1789
Asrael	Franchetti	1888
Astarte	Leroux	1901
Astianasse	Leo	1725
	Buononcini	1727
	Jommelli	1741
Attaque du Moulin, L'	Bruneau	1893
Attila	Verdi	1846
Avviso ai Maritati	Cimarosa	1780
	Isouard	1795
Asémia	Dalayrac	1787
Ballo in Maschera, Un	Verdi	1859
Barbares, Les	Saint-Saëns	1901
Barbarina, La	Neitzel	1912
Barbe-Bleue	Offenbach	1866
Barbier de Trouville, Le	Lecocq	1871
Barbier von Bagdad, Der	P. Cornelius	1858
Barbiere di Siviglia, Il	Rossini	1816
Barcarolle, La	Auber	1845
Bärenhäuter, Der	S. Wagner	1899
Bartered Bride, The	Smetana	1866
Basilius	Keiser	1693
Bastien und Bastienne	Mozart	1768
Bavards, Les	Offenbach	1863
Bayadères, Les	Catel	1810
Bayard à Mésières	Boieldieu, Catel, Isouard and Cherubini	1814
Béatrice	Messager	1914
Beatrice di Tenda	Bellini	1833
Béatrice et Bénédict	Berlioz	1862
Bégaiements d'Amour	Grisar	1864
Beggars' Opera, The	Pepusch	1728
Beiden Schützen, Die	Lortzing	1837
Belisario	Donizetti	1836
Belle Arsène, La	Monsigny	1773
Belle Hélène, La	Offenbach	1864
Bellérophon	Lully	1679
Benvenuto Cellini	Berlioz	1838
Berenice	Piccini	1764
	Zingarelli	1811
	Magnard	1911
Bergère Chatelaine, La	Auber	1820

Opera	Composer	First produced
Bergers, Les	Offenbach	1865
Berggeist, Der	Spohr	1835
Bergtagna, Den	Hallström	1874
Bettelstudent, Der	Millöcker	1881
Bianca	Balfe	1860
Blanche de Provence	Boieldieu	1821
Boccaccio	Suppé	1879
Bohême, La	Puccini	1896
	Leoncavallo	1897
Bohemian Girl, The	Balfe	1843
Boris Godunov	Mussorgski	1872
Braniboři v Cechách	Smetana	1865
Brasseur de Preston, Le	Adam	1838
Brautwahl, Die	Busoni	1913
Bravo, Il	Mercadante	1839
Bride of Song, The	Benedict	1864
Bride of Venice, The	Benedict	1844
Briganti, I	Mercadante	1836
Buona Figliuola, La	Piccini	1760
Cadmus et Hermione	Lully	1673
Caïd, Le	Am. Thomas	1849
Cagliostro	Adam	1844
Calife de Bagdad, Le	Boieldieu	1800
Camargo	Lecocq	1878
Camille	Dalayrac	1791
Camillus	Gluck	1754
Canterbury Pilgrims, The	C. V. Stanford	1884
Captive, La	F. David	1866
Capuleti ed i Montecchi, I	Bellini	1830
Caractacus	Arne	1806
Carmélite, La	R. Hahn	1902
Carmen	Bizet	1875
Cartouche	H. Hofmann	1869
Cassandra	Guecchi	1905
Castor et Pollux	Rameau	1737
Catarina Cornaro	F. Lachner	1841
	Donizetti	1844
Catharine Howard	Litolff	1847
Catherine Grey	Balfe	1837
Catone in Utica	Vinci	1727
	Leo	1732
	Graun	1744
	Jommelli	1749
	Piccini	1770
	Paisiello	1788
Cavalleria Rusticana	Mascagni	1890
Caverne, La	Lesueur	1793
	Méhul	1795
Cendrillon	Isouard	1810
	Massenet	1899
Cenerentola, La	Rossini	1817
Cephalus et Procris	Grétry	1773
Chalet, Le	Adam	1834
Chaperons Blancs, Les	Auber	1836
Chemineau, Le	Leroux	1907
Chérubin	Massenet	1905
Chevalier d'Harmental, Le	Messager	1896
Chevalier Nahel, Le	Litolff	1863
Chilperic	Offenbach	1868
Cid, Le	Piccini	1763
	P. Cornelius	1860
	Massenet	1885
Cinq-Mars	Gounod	1877
Circe	Keiser	1734
	Cimarosa	1779
Ciro in Babilonia	Rossini	1812
	Raimondi	1820
Clari	Halévy	1828
Clemenza di Tito, La	Gluck	1751
	Mozart	1791
Cleopatra e Cesare	K. H. Graun	1742
Cléopâtre	Massenet	1914
Cloches de Corneville, Les	R. Planquette	1877
Colomba	A. C. Mackenzie	1883
Colombe, La	Gounod	1866
Comédie à la Ville, La	Gevaert	1848
Comte Carmagnola, Le	Am. Thomas	1841
Comte d'Ory, Le	Rossini	1828
Conchita	Zandonai	1911
Contes d'Hoffmann, Les	Offenbach	1881
Coq d'Or, Le	Rimski-Korsakov	1910
Cora	Méhul	1791
Coriolano	Cavalli	1669
	Caldara	1717
	Ariosti	1723
Corona, La	Gluck	1765
Cosi fan Tutte	Mozart	1790
Cour de Célimène, La	Am. Thomas	1855
Cour du Roi Pétaud, La	Delibes	1869
Cox and Box	Sullivan	1867
Créole, La	Offenbach	1875
Crispino e la Comare	L. and F. Ricci	1850
Cristoforo Colombo	Franchetti	1892
Crusaders, The	J. Benedict	1846
Cyrano de Bergerac	Damrosch	1913
Czar und Zimmermann	Lortzing	1837
Dafne (first real opera)	Peri	1594
Dalibor	Smetana	1868
Dame Blanche, La	Boieldieu	1825
Dame Invisible, La	Berton	1787
Dame Kobold	J. Raff	1870
Damnation de Faust, La	Berlioz	1846
Dämon, Der	Rubinstein	1875
Danseuse de Pompei, La	Nouguès	1912
Dardanus	Rameau	1739
	Sacchini	1784
Déjanire	Saint-Saëns	1898
Demetrio e Polibio	Rossini	1812
Demofoonte	Caldara	1733
	Leo	1741
	Gluck	1742
	Hasse	1748
Démophon	Cherubini	1788
Déserteur, Le	Monsigny	1769
Deux Avares, Les	Grétry	1770
Deux Aveugles, Les	Offenbach	1855
Deux Journées, Les	Cherubini	1800
Deux Nuits, Les	Boieldieu	1829
Devils' Opera, The	G. A. Macfarren	1838
Diana	Keiser	1712
Dido and Æneas	Purcell	1689
Didone	Piccini	1738
Didone Abbandonata	Scarlatti	1724
	Piccini	1767
	Mercadante	1823
Dieu et la Bayadère, Le	Auber	1830
Dimitri	Joncières	1876
Dimitri Donskoi	A. Rubinstein	1852
Dinorah	Meyerbeer	1859
Diva, La	Offenbach	1869
Djamileh	Bizet	1872
Djelma	Lefebvre	1894
Dolores	Bretón	1895
Domino Noir, Le	Auber	1837
Don Bucefalo	A. Cagnoni	1847
Don Carlos	Verdi	1867
Don César de Bazan	Massenet	1872
Don Giovanni (Don Juan)	Gluck	1761
	Mozart	1787
Don Pasquale	Donizetti	1843
Don Procopio	Bizet	1906
Don Quichotte	Massenet	1910
Don Quixote	Purcell	1694
	Schack	1792
	Macfarren	1846
	Moniuszko	1847
Don Sébastien	Donizetti	1843
Donne Curiose, Le	Wolf-Ferrari	1903
Dot, La	Dalayrac	1785
Double Echelle, Le	Am. Thomas	1837
Drapier, Le	Halévy	1840
Drei Pintos, Die	Weber	1888
Due Foscari, I	Verdi	1845
Eclair, L'	Halévy	1835
Eco e Narciso	Gluck	1779
Eden, L'	F. David	1848
Edenia	Dubois	1912
Edgar	Puccini	1889
Edoardo e Cristina	Rossini	1819
Egyptienne, L'	Lecocq	1890
Elektra	R. Strauss	1909
Elisa	Cherubini	1794
Elisabeth	Donizetti	1853
Elisir d'Amore, L'	Donizetti	1832
Enfant Prodigue, L'	Auber	1850
Enfant Roi, L'	Bruneau	1905
Entführung aus dem Serail, Die	Mozart	1782
Ernani	Verdi	1844
Ernelinde, Princess de Norvége	Philidor	1767
Eroe Cinese, L'	Gluck	1754
Ero e Leandro	Mancinelli	1897
Esclarmonde	Massenet	1889
Esmeralda	Dargomyzhsky	1847
	A. G. Thomas	1883
Etoile du Nord, L'	Meyerbeer	1854
Etranger, L'	D'Indy	1903
Eugen Onegin	Tschaikowsky	1892
Euridice	Peri and Caccini	1595
Euryanthe	Weber	1823
Evangelimann, Der	Kienzl	1895
Fairy Queen, The	Purcell	1692
Falegname di Livonia, Il	Donizetti	1819
Falkners Braut, Des	Marschner	1832
Falstaff	Balfe	1838
	Verdi	1893
Fanciulla del West, La	Puccini	1910
Faniska	Cherubini	1806
Faramondo	Handel	1738
Fatinitza	Suppé	1876
Faust	Spohr	1818
	Gounod	1859
Favorita, La	Donizetti	1840
Fedora	Giordano	1898
Feen, Die	Wagner	1888
Feldlager in Schlesien, Das	Meyerbeer	1844
Feldprediger, Der	Millöcker	1884
Félix	Monsigny	1777

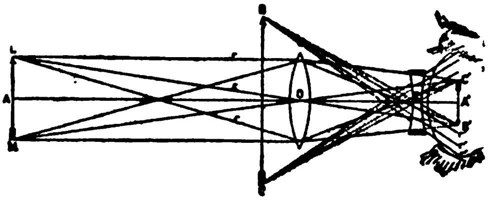
Opera	Composer	First produced
Feramors	Rubinstein	1863
Fernand Cortes	Spontini	1809
Ferne Klang, Der	Schreker	1912
Fervaal	Vincent d'Indy	1897
Fête du Village Voisin, La	Boieldieu	1816
Feuersnot	R. Strauss	1901
Fiancée, La	Auber	1829
Fiancée du Diable, La	Massé	1855
Fidelio	Beethoven	1805
Figaro, Le Nozze di	Mozart	1786
Figlia di Jorio	Franchetti	1906
Fille de Madame Angot, La	Lecocq	1872
Fille du Régiment, La	Donizetti	1840
Fils du Brigadier, Les	Massé	1867
Finta Giardiniera, La	Mozart	1775
Fledermaus, Die	J. Strauss	1874
Fliegende Holländer, Der	Wagner	1843
Folkunger, Die	Kretschmer	1874
Forestier, Le	Flotow	1840
Fortunio	Messager	1907
Forza del Destrino, La	Verdi	1862
Fra Diavolo	Auber	1830
Francesca da Rimini	Zandonai	1914
Françoise de Rimini	Am. Thomas	1882
Frédégonde	Guiraud	1895
Freischütz, Der	Weber	1821
Fürst und Sänger	F. Mottl	1893
Galatée	Massé	1852
Gasparone	Millöcker	1884
Gazza Ladra, La	Rossini	1817
Geisha, The	Jones	1896
Genoveva	Schumann	1850
Germania	Franchetti	1902
Ghiselle	César Franck	1896
Gille et Gillotin	Am. Thomas	1874
Gioconda, La	Ponchielli	1876
Gioielli della Madonna, I	Wolf-Ferrari	1911
Giorno di Regno, Un	Verdi	1840
Giovanna d'Arco	Verdi	1845
Giovanni Gallurese	Montemezzi	1905
Giralda	Adam	1850
Girl of the Golden West, The	Puccini	1910
Giroflé-Girofla	Lecocq	1874
Giulio Sabino	Sarti	1781
Gloria	Cilea	1907
Golden Web, The	A. G. Thomas	1893
Goldene Kreuz, Das	I. Brüll	1875
Götterdämmerung, Die	Wagner	1876
Göttin der Vernunft, Die	J. Strauss	1897
Götz von Berlichingen	Goldmark	1902
Goyescas	Granados	1916
Grand Casimir, Le	Lecocq	1879
Grande-Duchesse de Gérolstein, La	Offenbach	1867
Grand' Tante, La	Massenet	1867
Griselda	Buononcini	1722
Griselidis	Massenet	1901
Grossadmiral, Zum	Lortzing	1847
Guarany, Il	C. Gomez	1870
Gudrun	Reissmann	1871
	Klughardt	1882
	Draeseke	1884
Guido et Genevra	Halévy	1838
Guillaume Tell	Rossini	1829
Guntram	Richard Strauss	1894
Gustave III	Auber	1833
Habanera, La	Laparra	1908
Hamlet	Am. Thomas	1868
Hans Heiling	Marschner	1833
Hans, le Joueur de Flûte	Ganne	1906
Hans Sachs	Lortzing	1840
Hänsel und Gretel	Humperdinck	1893
Harald der Wiking	Hallén	1881
Heilige Berg, Der	Sinding	1914
Heimchen am Herd, Das	Goldmark	1896
Hellera	Montemezzi	1909
Henri IV, Le Jeune	Méhul	1797
Henri VIII	Saint-Saëns	1883
Heirat wider Willen, Die	Humperdinck	1905
Herculaneum	F. David	1859
Hérodiade	Massenet	1884
Herzog Wildfang	S. Wagner	1901
Hésione	Campra	1700
Hexe, Die	Enna	1892
Hexfallen	Hallén	1896
Hippolyte et Aricie	Rameau	1733
Hochzeit des Camacho, Die	Mendelssohn	1827
Hubička	Smetana	1876
Huguenots, Les	Meyerbeer	1836
Hulda	César Franck	1894
Idomeneo, Rè di Creta	Mozart	1781
Ifigenia in Aulide	Cherubini	1788
Ile du Rêve, L'	Hahn	1898
Ilsebill	Klose	1903
Incoronazione di Poppea, L'	Monteverde	1642
Inganno Felice, L'	Paisiello	1798
	Rossini	1812
Ingeborg	Geisler	1884
Iphigénie en Aulide	Gluck	1774
Iphigénie en Tauride	Gluck	1779
	Piccini	1781
Iris	Mascagni	1898
Isabeau	Mascagni	1911
Isis	Lully	1677
Isoline	Messager	1899
Italiana in Algeri, L'	Rossini	1813
Ivan le Terrible	Rimski-Korsakov	1873
Ivanhoe	Sullivan	1891
Jacquerie, La	Lalo	1895
Jean de Paris	Boieldieu	1812
Jean qui pleure et Jean qui rit	Offenbach	1865
Jenny Bell	Auber	1855
Jessonda	Spohr	1823
Jeunesse de Figaro, La	Leoncavallo	1906
Joan of Arc	Roze	1913
Jocelyn	Godard	1888
Jolanthe	Tschaikowsky	1893
Jolie Fille de Perth, La	Bizet	1867
Jongleur de Notre Dame, Le	Massenet	1902
Joseph	Méhul	1807
Judith	Seroff	1863
Juive, La	Halévy	1835
Julien	Charpentier	1913
Kain und Abel	Weingartner	1914
Karneval in Rom, Der	J. Strauss	1878
Kenilworth	B. O. Klein	1895
Kinder der Heide, Die	Rubinstein	1861
King Arthur	Purcell	1791
Knyaz Igor	Borodin	1891
König Manfred	K. Reinecke	1867
Königin von Saba, Die	Goldmark	1875
Königskinder, Die	Humperdinck	1910
Kuhreigen, Der	Kienzl	1911
Kuss, Der	Smetana	1876
Lakmé	Delibes	1883
Lalla Roukh	F. David	1862
Landfriede, Der	Brüll	1877
Libussa	Smetana	1881
Liebeskampf, Der	Meyer-Helmund	1892
Liebesketten	D'Albert	1912
Liebesverbot, Das	Wagner	1836
Life for the Czar, The	Glinka	1836
Lily of Killarney, The	Benedict	1862
Linda di Chamounix	Donizetti	1842
Lobetanz	Thuille	1898
Lodoïska	Cherubini	1791
	Kreutzer	1791
Lohengrin	Wagner	1850
Lombardi alla Prima Crociata	Verdi	1843
Lorelei	Catalani	1890
Louise	Charpentier	1900
Lucia di Lammermoor	Donizetti	1835
Lucio Silla	Mozart	1772
Lucrezia Borgia	Donizetti	1833
Ludovic	Hérold and Halévy	1833
Luisa Miller	Verdi	1849
Lustige Krieg, Der	J. Strauss	1881
Lustige Witwe, Die	Lehar	1905
Lustigen Weiber von Windsor	Nicolai	1849
Macbeth	Verdi	1847
	Bloch	1910
Madama Butterfly	Puccini	1904
Madame Favart	Offenbach	1879
Madame Sans Gêne	Giordano	1915
Madeleine	Herbert	1914
Maestro di Musica, Il	Pergolesi	1731
Mage, Le	Massenet	1891
Magicienne, La	Halévy	1858
Maid Marian	Bishop	1822
	De Koven	1901
Maid of Artois, The	Balfe	1836
Maison à vendre	Dalayrac	1800
Maître de Chapelle, Le	Paër	1821
Maître Martin	Blockx	1892
Makkabäer, Die	Rubinstein	1875
Mala Vita	Giordano	1892
Mandragola	Waghalter	1914
Manon	Massenet	1884
Manon Lescaut	Puccini	1893
Manru	Paderewski	1901
Maometto Secondo	Rossini	1820
Maréchal Ferrant, Le	Philidor	1761
Margherita d'Anjou	Meyerbeer	1820
Maria Stuarda	Mercadante	1821
	Donizetti	1834
Mariage Impossible, Le	Grisar	1833
Marie	Hérold	1826
Marino Faliero	Donizetti	1835
Marion Delorme	Ponchielli	1885
Maritana	W. V. Wallace	1845
Marjolaine, La	Lecocq	1877
Marketenderin, Die	Humperdinck	1914
Martha	Flotow	1847
Martyrs, Les	Donizetti	1840
Masaniello	Auber	1828
Mascotte, La	Audran	1880
Masnadieri, I	Verdi	1847
Matilda di Ciabrano	Rossini	1821

Opera	Composer	First produced
Matrimonio Segreto, Il	Cimarosa	1792
Mazeppa	Tschaikowsky	1882
Médecin malgré lui, Le	Gounod	1858
Médée	Cherubini	1797
Medici, I	Leoncavallo	1893
Medusa	Hahn	1911
Mefistofele	Boito	1868
Meistersinger von Nürnberg, Die	Wagner	1868
Merlin	Goldmark	1886
Merope	Jommelli	1742
Messaline	De Lara	1899
Messidor	Bruneau	1897
Miarka	Georges	1905
Mignon	Am. Thomas	1866
Mikado, The	Sullivan	1885
Mireille	Gounod	1864
Mitridate Rè di Ponto	Mozart	1770
Mlada	Rimski-Korsakov	1892
Moïsè in Egitto	Rossini	1818
Moloch, Der	Schillings	1906
Mona	Parker	1912
Monna Vanna	Février	1909
Mort de Tintagiles, La	Nouguès	1905
Muette de Portici, La	Auber	1828
Nachtlager in Granada, Das	K. Kreutzer	1834
Naïda	Flotow	1873
Naïs	Rameau	1749
Natoma	Herbert	1911
Navarraise, La	Massenet	1894
Nero	Handel	1705
	A. Rubinstein	1879
Niccolò de' Lapi	Pacini	1873
Ninon de Lenclos	Eulambio	1912
Noces de Jeannette, Les	Massé	1853
Noces d'Olivette, Les	Audran	1879
Nonne Sanglante, La	Gounod	1854
Norma	Bellini	1831
Notre Dame	F. Schmitt	1914
Notte di Leggenda	Franchetti	1914
Novize von Palermo, Die	Wagner	1836
Nozze di Enea con Lavinia, Le	Monteverde	1641
	A. Scarlatti	1720
	Vinci	1724
Nuit de Cléopâtre, Une	Massé	1885
Nurmahal	Spontini	1822
Nyaga	Hallström	1885
Oberon	Weber	1826
Oberst Chabert	Waltershausen	1912
Oberto Conte di San Bonifacio	Verdi	1839
Oedipe à Colone	Sacchini	1787
Olympie	Spontini	1819
Oracolo, L'	Leoni	1905
Orfeo	Monteverde	1607
Orfeo ed Euridice	Gluck	1762
Orphée aux Enfers	Offenbach	1858
Otello	Rossini	1816
	Verdi	1887
Ouragan, L'	Bruneau	1901
Pagliacci, I	Leoncavallo	1892
Paladins, Les	Rameau	1760
Panier Fleuri, Le	Am. Thomas	1839
Paolo e Francesca	Mancinelli	1907
Pardon de Ploërmel, Le	Meyerbeer	1859
Paride ed Elena	Gluck	1770
Parisina	Mascagni	1913
Parsifal	Wagner	1882
Part du Diable, La	Auber	1843
Patience	Sullivan	1881
Paul et Virginie	Massé	1876
Pêcheurs de Perles, Les	Bizet	1863
Pêcheurs de St. Jean, Les	Widor	1906
Pélage	Spontini	1814
Pelléas et Mélisande	Debussy	1902
Pénélope	Fauré	1913
Pepita Jiménes	Albeniz	1896
Perle du Brésil, La	F. David	1851
Persée	Lully	1682
Petit Chaperon Rouge, Le	Boieldieu	1818
Petit Duc, Le	Lecocq	1878
Phaéton	Lully	1683
Philémon et Baucis	Gounod	1860
Philtre, Le	Auber	1831
Phrosine et Mélidore	Méhul	1794
Phryné	Saint-Saëns	1893
Pietro von Albano	Spohr	1827
Pinafore, H.M.S.	Sullivan	1878
Pipe of Desire, The	Converse	1910
Pique Dame	Tschaikowsky	1890
Pirata, Il	Bellini	1827
Pirates of Penzance, The	Sullivan	1879
Pirineos, Los	Pedrell	1902
Poia	A. Nevin	1910
Poliuto	Donizetti	1848
Polyeucte	Gounod	1878
Pomo d'Oro, Il	Cesti	1666
Pomone	Cambert	1671
Postillon de Lonjumeau, Le	A. Adam	1836
Pré aux Clercs, Le	Hérold	1832

Opera	Composer	First produced
Preciosa	Weber	1821
Princesse d'Auberge	Blockx	1896
Princesse Jaune, La	Saint-Saëns	1872
Prise de Troie, La	Berlioz	1890
Prophète, Le	Meyerbeer	1849
Proserpine	Lully	1680
	Paisiello	1803
	Saint-Saëns	1887
Psyché	Lully	1678
	Am. Thomas	1857
P'tites Michu, Les	Messager	1897
Puritani, I	Bellini	1835
Quentin Durward	Gevaert	1858
Quinto Fabio	Cherubini	1780
Quo Vadis	Chapi	1901
	Nouguès	1909
Rans des Vaches, Le	Kienzl	1911
Rapimento di Cefalo, Il	Caccini	1597
Ratcliff, Guglielmo	Mascagni	1895
Reine de Chypre, La	Halévy	1841
Reine de Saba, La	Gounod	1862
Reine Fiammette, La	Leroux	1903
Renaud	Sacchini	1783
Renaud d'Ast	Dalayrac	1787
Rè pastore, Il	Sarti	1753
	Mozart	1775
Rêve, Le	Bruneau	1891
Rêve d'Amour	Auber	1869
Rheingold, Das	Wagner	1869
Richard Cœur de Lion	Grétry	1784
Rienzi	Wagner	1842
Rigoletto	Verdi	1851
Ring des Nibelungen, Der: the tetralogy comprising Das Rheingold, Die Walküre, Siegfried, and Götterdämmerung (qq.v.)	Wagner	1876
Risurresione	Alfano	1904
Rita	Donizetti	1860
Ritorno d'Ulisse, Il	Monteverde	1641
Robert Bruce	Rossini	1846
Robert le Diable	Meyerbeer	1831
Robin Hood	Macfarren	1860
	De Koven	1890
Roi de Lahore, Le	Massenet	1877
Roi d'Ys, Le	Lalo	1888
Roi d'Yvetot, Le	Adam	1842
Roi l'a dit, Le	Delibes	1873
Roland	Piccini	1778
Roland von Berlin, Der	Leoncavallo	1904
Roma	Massenet	1912
Romeo and Julia in the Village	Delius	1907
Roméo et Juliette	Bellini	1859
	Gounod	1867
Rosamunde	Schubert	1823
Rosaura, La	Scarlatti	1690
Rosenkavalier, Der	R. Strauss	1911
Rosières, Les	Hérold	1817
Rübezahl	Flotow	1854
Rubin, Der	D'Albert	1893
Ruggiero, Il	J. A. Hasse	1771
Runenstein, Am	Flotow	1868
Ruslan e Ludmilla	Glinka	1842
Russalka	Dargomyzhsky	1867
Ruy Blas	Marchetti	1869
Sacrifice, The	Converse	1911
Sadko	Rimski-Korsakov	1898
Saffo	Pacini	1840
Salammbô	Reyer	1890
Salome	R. Strauss	1905
Samson et Dalila	Saint-Saëns	1877
Sappho	Gounod	1851
	Massenet	1897
Sarah	Grisar	1836
Sarazin	C. Cui	1899
Sardanapale	Joncières	1867
Savonarola	C. V. Stanford	1884
Schauspieldirektor, Der	Mozart	1786
Segreto di Susanna	Wolf-Ferrari	1909
Semiramide	Rossini	1823
Sémiramis	Catel	1802
Serment, Le	Auber	1832
Serva Padrona, La	Pergolesi	1733
	Paisiello	1781
Sesostrate	J. A. Hasse	1726
Shamus O'Brien	C. V. Stanford	1896
Shérif, Le	Halévy	1839
Siberia	Giordano	1903
Siège de Corinthe, Le	Rossini	1826
Siegfried	Wagner	1876
Sigurd	Reyer	1884
Si j'étais Roi	Adam	1852
Simone Boccanegra	Verdi	1857
Sirène, La	Auber	1844
Snegorotchka	Rimski-Korsakov	1882
Sogno di Scipione, Il	Mozart	1772
Songe d'une Nuit d'Été, Le	Am. Thomas	1850
Sonnambula, La	Bellini	1831
Sorcier, Le	Philidor	1764

Opera	Composer	First produced
Spitzentuch der Königin, Das	J. Strauss	1880
Sposo Deluso, Lo	Mozart	1784
Stella Maris	Kaiser	1910
Stradella. See *Alessandro Stradella*, above		
Sylvana	Weber	1810
Tancredi	Rossini	1813
Tannhäuser	Wagner	1845
Tarare	Salieri	1747
Tcharodjeika	Tschaikowsky	1887
Telemacco	Scarlatti	1718
	Gluck	1750
Télémaque dans l'Ile de Calypso	Lesueur	1796
Temistocle	Caldara	1736
	J. C. Bach	1760
Tempête, La	Am. Thomas	1889
Templer und die Jüdin, Der	Marschner	1829
Templiers, Les	Litolff	1886
Thaïs	Massenet	1894
Thésée	Lully	1675
Tiefland	D'Albert	1903
Timbre d'Argent, Le	Saint-Saëns	1877
Torquato Tasso	Donizetti	1833
Torvaldo e Dorliska	Rossini	1815
Tosca	Puccini	1900
Traviata, La	Verdi	1853
Trial by Jury	Sullivan	1875
Tribut de Zamora, Le	Gounod	1881
Tristan und Isolde	Wagner	1865
Trois Masques, Les	De Lara	1912
Trompeter von Säkkingen, Der	Nessler	1884
Troubadour, The	Mackenzie	1886
Trovatore, Il	Verdi	1853
Troyens, Les	Berlioz	1863
Undine	Hoffmann	1816
	Lortzing	1845
	Lvoff	1846
Unter Räubern	Rubinstein	1883
Uthal	Méhul	1806
Vakula	Tschaikowsky	1876
Vampyr, Der	Marschner	1828
Vassallo di Szigeth, Il	Smareglia	1889
Vendôme en Espagne	Hérold and Auber	1823
Verkaufte Braut, Die	Smetana	1866
Véronique	Messager	1898
Versiegelt	Blech	1908
Vestale, La	Spontini	1807
Veuve Grapin, La	Flotow	1859
Vie Parisienne, La	Offenbach	1866
Villi, Le	Puccini	1884
Vivandière, La	Godard	1895
Vizeadmiral, Der	Millöcker	1886
Volière, La	Lecocq	1888
Voyevoda	Tschaikowsky	1869
Waldmädchen, Das	Weber	1800
Waldmeister	J. Strauss	1895
Walküre, Die	Wagner	1876
Wally, La	Catalani	1892
Wanda	Dvořák	1876
Werther	Massenet	1892
Widerspenstigen Zähmung, Der	Götz	1874
Wildschütz, Der	Lortzing	1842
William Ratcliff	C. Cui	1869
Wintermärchen, Ein	Goldmark	1908
Zaïre	Bellini	1829
	Mercadante	1831
	Lefebvre	1887
Zampa	Hérold	1831
Zanetta	Auber	1840
Zanetto	Mascagni	1896
Zauberflöte, Die	Mozart	1791
Zauberharfe, Die	Schubert	1820
Zaza	Leoncavallo	1900
Zelmira	Rossini	1821
Zémire et Azor	Grétry	1771
Zerline	Auber	1851
Zingari, Gli	Leoncavallo	1912
Zoraïme et Zulnar	Boieldieu	1798
Zoroastre	Rameau	1749

OPERA GLASS. A small double telescope, used for looking at objects that require to be seen clearly and distinctly rather than greatly magnified. The opera glass is short and light, and, though it has usually small magnifying power (varying in most instances from two to three times), the large amount of light admitted by the object glass on account of its large angle of aperture enables it to present a well-illuminated picture which can be seen without undue strain to the eye. The opera glass allows the use of both eyes, which gives to the spectator the advantage of seeing objects stand out stereoscopically as in ordinary vision. It consists of two lenses, or sets of lenses, as each lens is generally achromatic and made up of two lenses of different glass fitted together. The object lens, which is the larger, is convex, and the eye lens is concave. They are mounted so that when the tubes are drawn out the distance between the two lenses shall be nearly equal to the difference of their focal lengths. The figure shows the action of the opera glass. *O* is the object lens and *E* is the eye lens, the line *AA'* representing the axis of the instrument. The object lens alone would form a real and inverted image *C'B'* of the distant object *LM* at or near its principal focus were it not for the concave eye lens which changes the direction of the rays and causes them to diverge instead of converge at the focus. Accordingly the rays appear to diverge from an erect and magnified image located at *BC*. The formation of the image may be understood by tracing the course of rays, *r*, *r*, *r*, diverging from some point of the original object such as *L*. These rays diverge until they meet the convex lens *O*, which makes them convergent and would bring them to a focus at *B'*, but the concave lens *E* causes them to diverge and take the direction of the rays r^1, r^1, r^1, entering the eye as if they came from the point *B*. See FIELD GLASS; TELESCOPE.



OPERA GLASS.

OPERA HOUSE. A theatre devoted chiefly or exclusively to the production of operas. Owing to the costliness of such production, a larger seating capacity than that of ordinary theatres is requisite in order to bring in the necessary revenue, while the musical character of the performances, the larger accommodation needed for the orchestra, and the great size of the auditorium introduce problems of acoustics more complex and difficult than those presented by theatres of ordinary size. Moreover, the opera has taken on such importance as a social function that there must be a far more abundant provision of boxes than is customary in other theatres, at least in the United States, where theatres generally have seldom more than a dozen boxes. In Europe the opera is in many countries a state institution, and opera houses of great magnificence have been erected by national or provincial governments or by municipalities. The most celebrated of these are the great opera houses in Paris and Vienna. The last named was the first of the two to be completed; it was the work of Van der Nüll (see NÜLL) and Siccardsburg, was built between 1865 and 1870, and forms one of the chief architectural ornaments of the city. The Paris opera house, long called Le Nouvel Opéra, is the most magnificent example of its class, having cost 75,000,000 francs; it was the masterpiece of J. L. C. Garnier (q.v.), who won the commission for its design in 1859, though the building was not begun until 1861 nor completed till 1874. The most important opera house in America is the Metropolitan Opera House in New York (1883) by Cady, a fine auditorium with a commonplace exterior. For other details, see THEATRE.

OPERCULUM, ō-pẽr'kū-lŭm. The lid by which the capsules of most mosses dehisce. When the lid is thrown off, it usually uncovers a peristome (q.v.) on the rim of the capsule.

OP'ERET'TA (It., little opera). An opera of a light character, generally comic or humorous. Between the various numbers spoken dialogue is introduced. Although originally operettas were written in one act, they now contain generally two. As a rule these productions are ephemeral, but the operettas of Johann Strauss, Offenbach, Suppé, Millöcker, Genée, and Sir Arthur Sullivan have survived their composers. See OPERA.

OPHELIA, ō-fēl'yȧ. In Shakespeare's *Hamlet*, the daughter of Polonius, in love with Hamlet.

OPHELTES, ō-fĕl'tēz. See HYPSIPYLE.

OPH'ICLEIDE (from Gk. ὄφις, *ophis*, serpent + κλείς, *kleis*, key). A musical wind instrument of brass or copper, which ceased to be used in the orchestra about the middle of the nineteenth century and was superseded by the bass tuba in E flat.

OPHID'IA (Neo-Lat. nom. pl., from Gk. ὀφίδιον, *ophidion*, dim. of ὄφις, *ophis*, serpent). An order of reptiles of the subclass Sauria, the serpents, which are distinguished from lizards by the fact that the right and left halves of the lower jaws are connected by an elastic band. See SNAKE.

OPHILETA, ŏf'ĭ-lē'tȧ. A genus of fossil gastropods very characteristic of the lower Ordovician strata of North America. The shells are from ½ to 2 inches in diameter, with impressed spires and flat or slightly concave lower surfaces. The upper surfaces of the whorls are sharply keeled, the keel of the outermost whorl being higher than those of the inner whorl. The shells resemble those of the genus *Euomphalus*, to which they are allied. About 15 species range from Potsdam to Trenton limestones, and of these *Ophileta complanata*, of the New York and Canadian Beekmantown limestones, is the best known.

O'PHIOCEPH'ALUS. See SNAKE-HEADED FISH.

OPHIOGLOSSUM, ŏf'ĭ-ō-glŏs'ŭm. A genus of ferns giving name to the Ophioglossaceæ (adder's-tongue family), a family characterized by bearing its sporangia on a special branch (fertile spike) arising from the face of the leaf. The family comprises five genera, two of which are represented in North America. *Ophioglossum* is distinguished from the other American genus (*Botrychium*) by its simpler leaves, with reticulate veins, and sporangia cohering in the spike. There are about 45 species, widely distributed, seven of which belong to North America. The most common species is *Ophioglossum vulgatum* (adder's-tongue), occurring in moist meadows and boggy thickets from Canada to Florida. It has a lanceolate blade, from the base of which arises the single long-stalked spike.

O'PHIOL'ATRY. The worship of serpents. See NATURE WORSHIP.

OPHIR, ō'fẽr. An Alaskan mining camp, the centre of a placer district on the upper Innoko River, about 150 miles southeast of Kaltag (Map: Alaska, G 4). Among the projected railways to be built by the United States a line was recommended, 229 miles long, from Susitna valley to the Kuskokwim valley, which would reach this district. Pop., 1915, about 500.

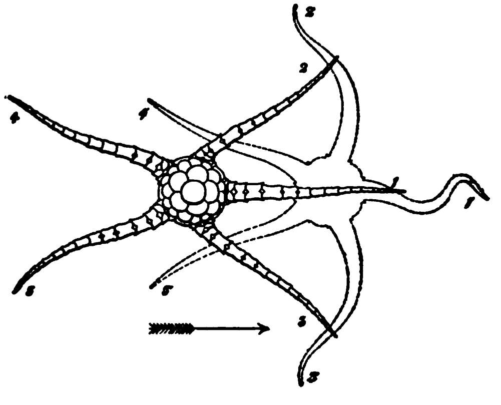
OPHIR (Heb. *Ophîr*, Ophir). The region to which the ships of Hiram and Solomon went from Eziongeber and whence they brought gold, precious stones, etc. (1 Kings ix. 26–28, x. 11, 12; 2 Chron. viii. 18, ix. 10). The region was chiefly remarkable for its gold. (Cf. Isa. xiii. 12; Job xxii. 24 et al.) The location of Ophir is a much vexed question. In Gen. x. 29 Ophir is mentioned in a list of the sons of Joktan. The names in the list are those of countries, and the Joktanites belong to southern Arabia. The inclusion of Ophir shows, at least, where tradition placed the country, and there is much that speaks in favor of this traditional view, since southern Arabia was known to the ancients as a gold-producing country. Hence Glaser places Ophir on the east coast of Arabia, on the Persian Gulf. Other locations, however, have advocates, notably Zimbabwe in Mashonaland (q.v.), South Africa. The Ethiopian coast of the Red Sea, Ceylon, and the Malay Peninsula have also been proposed. Josephus (*Ant.*, viii, 7, 2), Keil, Guthe, Oppert, and Dahse have distinguished between the expeditions to Ophir and those in Tarshish ships to another gold land. It has been pointed out that in 1 Kings x. 22 and 2 Chron. ix. 21 Ophir is not mentioned in connection with the Tarshish ships, that in 2 Chron. viii. 18 Huram may have been supposed to send ships as well as men to Eziongeber because in the chronicler's time Necho's Canal was open, and that ships going to Tarshish (Tartessus in Spain) and beyond may have needed three years for their expedition. Dahse has conjectured that the latter actually went to the Gold Coast.

Bibliography. Keil, *Ueber die Hiram-Salomonische Schiffart nach Ophir und Tharschisch* (Dorpat, 1834); Price, "Ophir," in Hastings, *Dictionary of the Bible*, vol. iii (New York, 1900); A. K. Keane, *The Gold of Ophir* (London, 1901); T. K. Cheyne, "Ophir," in *Encyclopædia Biblica*, vol. iii (ib., 1902); Gustav Oppert, *Tharschisch und Ophir* (Berlin, 1903); Dahse, "Ein Zweites Goldland Salomos," in *Zeitschrift für Ethnologie*, vol. xliii (Berlin, 1911).

OPHITES, ŏ'fīts (Lat. *Ophites*, from Gk. 'Οφίτης, Ophite, from ὀφίτης, relating to a serpent, from ὄφις, *ophis*, serpent). A Gnostic sect. With the other Gnostics they shared the general belief of dualism, the conflict of matter and spirit, the emanations, the demiurgos, and other notions common to the many subdivisions of this school, but were distinguished from the rest by their peculiar doctrine and worship connected with their ophis, or serpent. Hence they were also called Naassenes (from Heb. *nâchâsh*, serpent). Like most Gnostics they regarded the demiurgos, or the Jehovah of the Old Testament, with great abhorrence, because he has persuaded men that he is the Supreme. Considering the emancipation of man from the power and control of the demiurgos as a most important end, they considered the serpent who tempted Eve, and introduced into the world knowledge and revolt against Jehovah, to have been the great benefactor of the human race. Hence their worship of the serpent. Information regarding them is very meagre and comes chiefly from antagonistic sources, the earliest being from Irenæus (*Adv. Hær.*, 1, 11). They were in existence as late as the sixth century. Consult the monographs relating to them by Gruber (Würzburg, 1864) and Hönig (Berlin, 1889); also E. H. Schmidt, *Die Gnosis*, vol. i (Jena, 1903). See GNOSTICS.

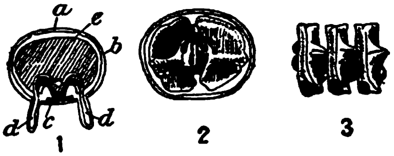
OPHIUCHUS, ŏf'ĭ-ū'kŭs (Lat., from Gk. *ὀφιοῦχος*, *ophiouchos*, holding a serpent; from *ὄφις*, *ophis*, serpent, and *ἔχειν*, *echein*, to hold). A large equatorial constellation immediately south of Hercules. It has no very bright stars, but a number of interesting double stars and fine globular clusters. 70 Ophiuchi is a binary system with a parallax of 0.162″ and a period of 88.4 years, its two components being of the fourth and sixth magnitudes respectively; it is also notable for the striking changes of color which its two components have undergone since they were first separated by Sir William Herschel. Three novæ are recorded as having appeared in this constellation: in 123 A.D.; in 1604, discovered by Kepler and observed also by Galileo; and in 1848, discovered by Hind.

O'PHIUROI'DEA (Neo-Lat. nom. pl., from Gk. *ὄφις*, *ophis*, serpent + *οὐρά*, *oura*, tail). The class of brittle stars, or sand stars, of which *Ophiura* is the typical genus. Ophiuroids (or ophiurans) are star-shaped, freely moving echinoderms (see ECHINODERMATA), with a flat, roundish or polygonal disk, from which suddenly arise five arms, which are slender, cylindrical, and contain no spacious continuation of the cœlomic cavity of the disk, or hepatic cœca, while there is no vent. There are no ambulacral grooves in the arms, and the suckers are but little used in locomotion, which is mainly effected by the arms themselves, the feet, or ambulacra, being thrust out laterally and acting as tactile organs. The mouth and also the madreporite are on the underside of the disk. On the ventral surface, also, are five slits which connect with a corresponding number of respiratory sacs (bursæ) into which the ovaries or spermaries open. The eggs passing out through these slits are fertilized in the water, the sexes being distinct. The ophiuroids, as a rule, pass through a well-marked metamorphosis, the free-swimming young being called a pluteus. Certain forms undergo self-division, and in others development is direct. The class is divided into two orders, Ophiurida and Euryalida, the latter having the arms greatly subdivided into long curly tendrils, as in *Astrophyton*, the basket fish. Fossil ophiuroids begin to appear in the Silurian period, while genuine modern forms arose in the Middle Trias. For a recent review of the group with references to bibliographies, consult Koehler, "A Contribution to the Study of the Ophiurans of the United States National Museum," in *United States National Museum, Bulletin No. 84* (Washington, 1914). See BRITTLE STARS.



AN OPHIURAN.

Natural movements of a brittle star when proceeding along a solid horizontal surface. The arms are numbered.



STRUCTURE OF THE OPHIURAN ARM.

1, diagrammatic cross section of an arm; *a*, a dorsal plate; *b*, side plate; *c*, ventral plate; *d*, *d*, tube feet, connected and penetrated by the ambulacral vessel; *e*, vertebral ossicle. 2, a vertebral ossicle, seen from the inward side, and surrounded by the external arm plates. 3, vertebral ossicles, viewed from the side.

Both orders of the Ophiuroidea—the Ophiurida having simple arms and the Euryalida with branched arms—are represented from the Silurian onward, and the fossil forms show few important differences from their modern descendants. They are usually rare, but a few localities in the Devonian and in the Triassic and Jurassic shales and limestones have furnished well-preserved specimens in abundance. Such localities are Bundenbach (Devonian) and Solenhofen (Jurassic) in Germany and Crawfordsville (Carboniferous) in Indiana. The more important genera are: Silurian—*Eucladia*, *Protaster*, *Tæniaster;* Devonian—*Protaster*, *Ophiura;* Carboniferous—*Onychaster;* Mesozoic—*Aspidura*, *Geocoma*, and *Ophioglypha*, with other modern genera. See BRITTLE STARS; ECHINODERMATA.

OPHTHAL'MIA (Lat., from Gk. *ὀφθαλμία*, disease of the eyes, from *ὀφθαλμός*, *ophthalmos*, eye; connected with *ὄπωπα*, *opōpa*, I have seen, *τὼ ὄσσε*, *tō osse*, the (two) eyes, Lat. *oculus*, OChurch Slav. *oko*, Skt. *akṣan*, OHG. *ouga*, Ger. *Auge*, Goth. *augō*, AS. *ēage*, Eng. *eye*). A term originally used to denote inflammation of the eye generally and still employed in that sense at times, but now usually restricted to designate inflammatory affections of the conjunctiva or mucous coat of the eye. *Ophthalmia neonatorum* is a violent, acute, purulent infection of the eyes of new born infants, generally due to the gonococcus and often resulting in blindness. The term *Egyptian ophthalmia* embraces a number of contagious eye diseases and is applied particularly to the granular form, or trachoma. (See CONJUNCTIVITIS.) *Sympathetic ophthalmia* is a term used to describe an inflammation in one eye due to a similar inflammation of the other. This usually follows perforation of the eyeball by foreign bodies or ulcer of the cornea or operations in the ciliary region. The sympathizing eye is usually affected about five to eight weeks after the injury of the exciting eye. After one or more periods of irritability of the sympathizing eye, marked by dread of light, pain in the eye, lachrymation, and dimness of vision, the sympathetic inflammation comes on. Removal of the exciting eye before this takes place will prevent its occurrence. The course of the inflammation is slow, and blindness follows after a variable period. The cause of sympathetic ophthalmia is not positively known, but it is probably due to extension of infection through the sheath of one optic nerve by way of the optic chiasm to that of the nerve of the other eye. (See Eye.) Treatment consists in the removal of the exciting eye at the first sign of sympathetic inflammation; after this period it is of no avail. The inflammation itself is treated as in cases due to other causes. See Iritis.

OPHTHAL′MIC GANGLION. One of the four ganglia connected with the branches of the fifth cranial nerve and thought to be a part of the great sympathetic nerve. It is about the size of a pin's head and situated at the back part of the orbit, between the optic nerve and the external rectus muscle. It lies in a quantity of loose fat which makes its dissection somewhat difficult. It has three branches of communication (motor, sensory, and sympathetic), which enter its posterior border. The long branch (sensory) is derived from the nasal branch of the ophthalmic nerve (first division of the fifth nerve). The second branch or root (motor) is derived from a branch of the third nerve supplying the inferior oblique muscle of the eyeball. The third branch, or root, is a slender filament from the cavernous plexus of the sympathetic. According to Tiedemann this ganglion receives a filament of communication from Meckel's ganglion (q.v.). Its branches of distribution are the short ciliary nerves. These are 10 or 12 delicate filaments arising from the fore part of the ganglion in two bundles. They run forward with the ciliary arteries, pierce the sclerotic coat at the back part of the globe, pass forward in delicate grooves on its inner surface, and are distributed to the ciliary muscle and the iris. The ophthalmic ganglion is one of the most important of all nerve centres. The ciliary muscle is the muscle of accommodation of the eye, causing variation in the form of the aqueous humor and the crystalline lens so as to accommodate the focal length of the eye to the distance of objects. Its supply of nerve force to the muscular fibres of the iris is also intimately connected with the focal length of the eye apparatus.

The other three of the four ganglia above referred to are Meckel's, the otic, and the submaxillary (qq.v.).

OPH′THALMOL′OGY (from Gk. ὀφθαλμός, *ophthalmos*, eye + λόγος, *logos*, discourse, science). See Eye; Eye, Diseases of the.

OPH′THALMOM′ETER (from Gk. ὀφθαλμός, *ophthalmos*, eye, + μέτρον, *metron*, measure). An instrument used by oculists to determine the axis and degree of corneal astigmatism. It consists of a tube, containing a combination of convex lenses and a refracting prism, attached to a graduated arc, crossed by an arm bearing two objects called mires. One mire is fixed, the other movable; one is quadrilateral in shape, the other cut into five steps. In using the instrument the patient's face is fixed in a frame, while the examiner looks through the tube and focuses the images of the mires upon the patient's cornea. The mires are then approximated until images upon the cornea touch, and the arm rotated until the mires are in exact alignment, as indicated by a straight line drawn through them. The axis of astigmatism coincides with the position of the arm, and the amount of astigmatism is measured by the overlapping of the mires when it is rotated to a right angle with its first position. Each step indicates one diopter of astigmatism.

OPHTHAL′MOSCOPE (from Gk. ὀφθαλμός, *ophthalmos*, eye + σκοπεῖν, *skopein*, to view). An instrument invented by Helmholtz in 1851 for the purpose of examining the deep-seated structures of the eye and for detecting disease in it. It is a concave circular mirror of about 10 inches focus, having a hole in the centre and mounted on a handle and accompanied by a set of convex and concave lenses. In the most approved forms the mirror is cut in approximately the form of a parallelogram and is so arranged as to be tilted towards either side. The lenses are placed near the circumference of a disk, by pressure upon the reeded edge of which they are brought successively before the opening in the mirror. Light is reflected into the interior of the eye by the mirror, and a portion returns, through the opening in the mirror and through the lens placed opposite it, to the eye of the observer. Some ophthalmoscopes provide all necessary illumination by having attached a small electric light with a battery. Professor Gullstrand has recently invented an ophthalmoscope which enlarges the fundus picture from 5 to 40 times. This instrument somewhat resembles a telescope, and with it both eyes of the observer can be used simultaneously with a stereoscopic effect. In addition to this an ingenious device enables the fundus to be examined by two observers at the same time.

Ophthalmoscopic Examination. The ophthalmoscope is used in a dark room, illumination being obtained from an Argand burner or electric light which is placed several inches from either side of the patient and somewhat behind him and on a level with the eyes. Facing the patient, the observer looks through the perforation in the mirror, which is held about 15 inches from the patient's eye and reflects light into it. An orange-red reflex from the fundus is seen in the normal eye. Dark spots show opacities of the media or cornea; ametropia (see Sight, Defects of) is shown by ability to see equally well, in all directions, the vessels in the fundus. Two methods are in use, the direct and the indirect. *Direct Method.*—This gives an erect image, magnified about 14 times, a smaller field at one time, allows estimation of errors of refraction by noting the lens which is required to give a clear view, and is less difficult. The light is placed on the side of the eye examined; the ophthalmoscope is held about one inch in front of the patient's eye. Different portions of the fundus are brought into view by movement of the eye of the patient. In this method correction by lenses must be made for errors of refraction of both patient and observer. *Indirect Method.*—This gives an inverted image of the fundus. For both this and the direct method the pupil should be dilated by some mydriatic. The ophthalmoscope is held with a positive lens of sufficient strength before the opening. The light is directed by the mirror into the eye through a strong convex lens held at its focal distance of about two inches in front of the patient's eye. By varying the distance of the mirror and lens an inverted image of the fundus is obtained. The fundus appears as an orange-red surface, darker in brunets than in blonds, finely dotted by pigment cells. It is crossed by blood vessels which radiate from the optic disk, the arteries bright, the veins darker red and more tortuous. The optic disk is usually circular, pinkish, often bordered by a white ring of sclera and an external dark ring formed by the choroid coat. The blood vessels emerge from a depression at the centre of the disk. The appearance of the normal fundus varies greatly. Much practice is required for the skillful use of the ophthalmoscope, but it is now as essential in the diagnosis of diseases of the eye as the stethoscope is in that of thoracic affections. Those of other parts of the body may also be detected or confirmed by its use. For example, inflammation of the optic disk occurs in 90 per cent of brain tumors. See VISION.

OPIE, ō'pĭ, AMELIA (ALDERSON) (1769–1853). An English novelist and poet. She was the second wife of John Opie (q.v.), the painter, whom she married in 1798. After her husband's death she lived at her father's house in Norwich. She was an attractive woman and occupied a high position in London society. On Sundays during her stay there her house was thronged with visitors, including Sheridan, Sydney Smith, Byron, Scott, Wordsworth, and Humboldt. In 1825 she joined the Society of Friends and devoted herself to charitable work, helping Elizabeth Fry (q.v.) to improve the current system of hospital management. Among her publications are: *Father and Daughter* (1801); *Miscellaneous Poems* (1802); *Adeline Mowbray* (1804); *Detraction Displayed* (1828); *Lays for the Dead* (1833).

OPIE, EUGENE LINDSAY (1873–). An American pathologist. He was born at Staunton, Va., and graduated M.D. from Johns Hopkins University in 1897. From 1897 to 1904 he was connected with the faculty of his alma mater and afterward was a member of the Rockefeller Institute in New York City for six years. During this time he demonstrated with W. G. McCallum the sexual conjugation of the mosquito in the flagellated forms and worked on the pancreatic glycosuria. In 1910 he was called to Washington University, St. Louis, as professor of pathology and two years later became dean of the medical department. Among his writings are *Diseases of the Pancreas* (1903) and the following articles, which appeared also as reprints: "Studies on Malarial Parasites" (1898); "The Encymes in Phagocytic Cells of Inflammatory Exudates" (1906); "Inflammation" (1910); "Symposium on Poliomyelitis" (1913).

OPIE, JOHN (1761–1807). An English historical and portrait painter. He was born at St. Agnes, Cornwall, and was largely self-taught. His early attempts at art won the notice of Dr. Wolcott (Peter Pindar), who in 1780 took him to London, where he received numerous commissions from the fashionable world and was known as the Cornish Wonder. This favor, however, was soon withdrawn. Opie applied himself diligently to correcting his many defects in art and general culture. He furnished illustrations for Boydell's *Shakespeare* and Macklin's *Poets* and painted numerous historical pictures and portraits. The latter were largely of authors and authoresses and include those of William and Mary Godwin (National Gallery, London). In 1788 he was elected Academician, in 1805 was appointed professor of painting at the Academy, and in 1807 delivered before that institution four excellent lectures on painting which were published in 1809. While lacking in elegance and inharmonious in color, his works often show great vigor and individuality, as, e.g., "The Murder of Rizzio," and the "Assassination of James I," both in the Guildhall, London. For his second wife, see OPIE, AMELIA.

OPINION (Lat. *opinio*, from *opinari*, to suppose; connected with *optare*, to hope, *apisci*, Skt. *āp*, to obtain) (in law). An oral or written statement of the law governing a particular case which has been submitted for judicial determination. In English legal procedure the term is strictly applicable only to the judgments of the law lords delivered in the House of Lords (the term "judgment" being used to describe the reasoned decisions of the judges of the High Court and Court of Appeal), whereas in the courts of the United States the judgment, or decision, is distinguished from the opinion, which consists of a statement of the principles of law and the legal reasons which governed the court in reaching its decision. It was formerly the practice of judges to deliver their opinions orally from the bench, and, though this is still frequently done in cases of little difficulty, written decisions have become the rule in England as well as in the United States. The result of this change has been an enormous and unnecessary increase in the length of judicial opinions and the consequent unprecedented multiplication of law reports. Many efforts have been made by the legal profession to check this abuse, but thus far without appreciable result. Where separate opinions are handed down by judges sitting together as a court, the opinion of the majority is the only one which has legal effect and it is known as the "opinion of the court" or the "prevailing opinion." The majority opinion usually contains, besides the reasons of the court, the application of the principles of law therein enunciated to the particular case and a direction as to its disposition, and therefore includes the decision. For this reason an opinion and a decision are sometimes confused, and an opinion is often defined as a written statement of the decision.

Where a judge in the course of an opinion expresses his views as to the law on some point which may be incidental to, but is not necessarily involved in, the issues before him, such part of the opinion is said to be *obiter dictum* (Lat., outside remark), or extrajudicial, and has no binding effect as a statement of the law, although it may be referred to in argument on a mooted point of law, as the individual opinion of a learned judge. However, that part of the opinion which is necessary to the conclusion of the court, distinguished as the *ratio decidendi*, is deemed a statement of the law of the land, which inferior courts are bound to follow.

The statutes of some of the United States provide that certain public officers, such as the governor or a mayor of a city, may ask the courts for opinions on questions of law involving the public interests. For example, a governor might ask for a judicial interpretation of an obscure statute creating a new public office. An opinion delivered under such circumstances may be considered as law. See DECREE; JUDGMENT.

The oral or written statement of the law made by a counsel to his client is also known as an opinion. Such opinions have no weight as authorities in English or American law. In Roman legal procedure, however, the opinions of eminent lawyers, known as jurisconsults, were often obtained by the judges (who may not, themselves, have been learned in the law), and these *responsa prudentium* had much the same authority as have judicial opinions to-day and constitute the principal sources of the civil law of Rome as that has come down to us. See Civil Law.

OPINION EVIDENCE. See Evidence; Expert.

O′PISTHOC′OMI (Neo-Lat. nom. pl., from Gk. *ὀπισθόκομος, opisthokomos*, wearing the hair long behind, from *ὄπισθεν, opisthen*, behind + *κόμη, komē*, hair). Birds regarded as a suborder of the Gallinæ, including only a single species, the remarkable hoatzin (q.v.). In fact it seems probable that it deserves still greater taxonomic isolation in an order Opisthocomiformes. The order differs from other birds chiefly in the remarkable character of the sternum and shoulder girdle. The clavicles are ankylosed with the coracoids and with the manubrium of the sternum. The latter has a pair of notches on each side of its posterior margin, and the keel is cut away in front.

OPIS′THOGLYPH′A (Neo-Lat. nom. pl., from Gk. *ὄπισθεν, opisthen*, behind + *γλυφή, glyphē*, carving). A group of snakes of the family Colubridæ, characterized by the fact that one or more of the posterior maxillary teeth are grooved in front and in most cases serve the purpose of poison fangs, conveying venom from labial poison glands. (Cf. Proteroglypha.) They comprise about 300 species, occurring in all the warmer parts of the world excepting New Zealand and containing terrestrial, arboreal, and aquatic forms. All are more or less poisonous, but so far as man is concerned are comparatively harmless, since the poison is not very strong, does not exist in large quantities, and the fangs stand so far back that the snakes cannot easily inflict wounds with them. The tree snakes (*Dipsas, Septognathus*, etc.) of tropical South America and the cat snake (q.v.) are conspicuous examples.

OPITZ, ō′pĭts, Martin (1597–1639). A German poet and literary reformer, born at Bunzlau, Silesia, Dec. 23, 1597. He studied at Frankfort-on-the-Oder and at Heidelberg; visited with his friend Hamilton, a Dane, the Netherlands, where he became acquainted with Daniel Heinsius, and Jutland (1620); in 1621 accepted the call of Prince Bethlen Gabor to Transylvania as teacher of philosophy and belles-lettres at Weissenburg; returned to Silesia (1623); occupied various subordinate confidential posts at small German courts; was knighted by the Emperor Ferdinand II (1628); and died of the plague in Danzig, Aug. 20, 1639. For a century after his death he passed for the Father of German Poetry, less for his mediocre verses than for his critical *Aristarchus, seu de Contemptu Linguæ Teutonicæ* (or Contempt of the German Tongue) (1618), which asserted the equality of the German language with the French, Dutch, and Italian and laid the blame for the decadence of German poetry to authors of German blood who nevertheless neglected their native tongue for the Latin. His *Buch von der deutschen Poeterei*, a book of poetics, although quite brief, is so important that the year of its publication (1624) marks the beginning of a new era of German poetry. Opitz borrowed his poetical theories mostly from Scaliger, Heinsius, and Ronsard. Opitz recognized accent instead of quantity in his prosody, and accepted only iambic and trochaic measures. His poetical works, intended as models, are for the most part merely metrical prose. The Alexandrine, a measure of French origin, which had come to be the standard French verse in the sixteenth century, he made the ideal for German poets. The influence of Opitz did much to secure the acceptance of the literary German of Luther in the Catholic states and so to make a common German literature possible. In 1627 he wrote the verses of the oldest German opera, *Dafne*, after Rinuccini, music by Heinrich Schütz. Incomplete editions of Opitz's works were published (Danzig, 1641; Breslau, 1690; Frankfort, 1746; also reprints by Braune, Halle, 1876, and by G. Witkowski, ib., 1902). There are *Lives* by Strehlke (Leipzig, 1856), Hoffman von Fallersleben (ib., 1858), Weinhold (Berlin, 1862), and Palm (Breslau, 1862). Consult also: Borinski, *Die Kunstlehre der Renaissance in Opitzens Buch von der deutschen Poeterei* (Munich, 1883); Witkowski, *Aristarchus und das Buch der Poeterei* (Leipzig, 1888); Scherer, *Kleine Schriften*, vol. i (Berlin, 1893); Burdach, in *Forschungen zur deutschen Philologie* (ib., 1894); Perry, *From Opitz to Lessing* (Boston, 1884). For bibliography consult H. Oesterley, in the *Zentralblatt für Bibliothekswesen*, vol. ii (Leipzig, 1885).

O′PIUM (Lat., from Gk. *ὄπιον*, poppy juice, dim. from *ὀπός, opos*, juice, sap). The dried juice of the unripe capsules of a species of poppy (q.v.). Opium, as a commercial article, is of great importance, exceeding that of any other drug in use. The seed is sown in India in the beginning of November, it flowers towards the end of January or early in February, and three or four weeks later the capsules or poppy-heads are about the size of hens' eggs and are ready for operating upon. At this time the collectors take a little iron instrument called the nushtur and wound each full-grown poppy-head. This is always done in the afternoon; early on the following morning the milky juice which has exuded is collected with a kind of scoop called a sittooha and transferred to an earthen vessel called a kurrace. It is then transferred to a shallow open brass dish, which is left for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is very detrimental to the opium unless removed. It now requires daily attention and has to be turned frequently, so that the air may dry it equally, until it acquires the desired consistency, which requires three or four weeks; it is then packed in small earthen jars and taken to the factories. The opium is then thrown into vast vats, which hold the accumulations of whole districts, and the mass, being kneaded, is again taken out and made into balls or cakes for the market. The manufacture of opium is carried on in India, Turkey, Persia, and Egypt. Occasionally it has been produced in Germany, France, and England. Turkey opium is considered the best. The Chinese have been until recent years the greatest consumers of opium, but in 1907 the government, awaking to its deleterious effect upon the population, took measures to abolish the trade. In that year an agreement was made between Great Britain and China by which the Indian government was to reduce annually the exportation of opium into China and the poppy-raising industry in India was to be correspondingly curtailed. This agreement, renewed in 1911, anticipated the extinction of the opium trade by 1917. While this agreement has not been strictly kept, owing to lapses on the part of the Chinese government, nevertheless there has been a substantial decrease in the trade and in the opium habit.

In Europe and the United States opium is used chiefly for medicinal purposes, although in the last decade there has been an enormous increase in the importation into the United States of opium and its products, so that the per capita consumption of the drug exceeded many times that of European countries. Alarmists attributed this increase to the use of the drug by habitués, but the circumstance is probably explainable, partially at least, by the fact that the inhabitants of the United States take more medicine in general than Europeans. To meet this situation, as well as to carry out agreements made at an international conference held at The Hague in December, 1911, and signed by the United States, Germany, France, Great Britain, Italy, Persia, Japan, the Netherlands, Russia, Portugal, and Siam, a Federal antinarcotic law (the Harrison Law) was finally passed and became effective in 1915.

Physical and Chemical Properties. Good opium is a hard, compact solid of reddish-brown color, which leaves an uninterrupted stain when drawn across paper and breaks with a deeply notched fracture. It has a strong characteristic odor and a rather bitter, acrid taste. The *United States Pharmacopœia* requires that it shall contain at least 9 per cent of morphine, its most important alkaloid. Good Turkey opium contains 12 to 16 per cent and should average about 14. About 20 other alkaloids are found in opium, the most important being codeine, narceine, narcotine, and papaverine. It also contains meconic and other acids, gum, resinous and extractive matters, besides a volatile odorous principle. Although opium was cultivated for use before the Christian era, morphine was not discovered until 1816.

Some of the most important and characteristic constituents are meconic acid, morphine, and narcotine. The only isolated constituents of opium now extensively used in medicine are codeine, which is less powerful and less narcotizing than morphine and which is very widely used as a nerve sedative and to control excessive cough, and used also with good effect in diabetes mellitus; morphine and three derivatives of morphine—apomorphine (q.v.), dionin, and heroin (q.v.). The salts of these alkaloids and derivatives are preferred on account of their greater solubility.

Physiological Action. (1) In *small doses*, as from a quarter of a grain to a grain, opium acts as an agreeable stimulant, producing a sense of well-being and stimulating the imagination by blunting the reason, judgment, and memory, this effect being followed by a desire to sleep. The person awakes unrefreshed or with some headache, depression, dryness of the mouth and throat, and slight constipation. When it is given in a *full medicinal dose* (as from two to four grains), the stage of excitement is soon followed by contraction of the pupils, well-marked depression or torpor, both of the bodily and mental organs, and an almost irresistible sleepiness; these effects being usually succeeded by constipation, nausea, furred tongue, headache, and listlessness. Among Eastern nations, in whom the emotional element is strong, the imagination is highly stimulated, and the ingestion of opium is followed by loss of all disagreeable sensations with the onset of a delightful mental state, with gorgeous visions and a sense of happiness. Among the more stolid races the hypnotic effect is usually experienced at once, though many persons experience mental excitement after even a small dose. After *poisonous doses* the symptoms begin with mental confusion and stupor, generally without any previous stimulation. The stupor rapidly increasing, the person becomes motionless and insensible to external impressions; he breathes noisily and very slowly, with slow full pulse, the eyes shut, and the pupils contracted and not reacting to light; and the whole expression of the countenance is that of deep and perfect repose. As the poisoning advances the pulse becomes feeble, the muscles relaxed, respiration stertorous and constantly slower, and, unless assistance is speedily procured, death ensues from paralysis of the respiratory centre. If the person recovers, insensibility is succeeded by prolonged sleep, followed by nausea, vomiting, giddiness, and distaste for food. The treatment of acute morphine poisoning consists in removing the drug as far as possible, chiefly by washing out the stomach, in the administration of potassium permanganate, and in keeping the patient awake at any cost. This is accomplished by large doses of coffee, enforced exercise, and flagellation. If breathing is very slow, artificial respiration may keep the person alive until the drug is eliminated. In case of threatened failure of respiration or of the heart suitable stimulants are employed. The effects of morphine are practically the same as those of opium, but it is less likely to derange digestion, is less constipating, less diaphoretic, and less tetanizing. When given hypodermically, the stimulant effect is more marked and immediate.

(2) The *habitual use of opium*, whether the drug be eaten or smoked, is undoubtedly injurious to the constitution, although in numerous cases very large quantities of this drug may be regularly taken with comparative impunity.

Opium Smoking is a habit that is chiefly confined to China and the islands of the Indian Archipelago. An extract, called chandoo, is cooked by the smoker on a slender needle over a small lamp into a pill about the size of a pea. The pill is stuck over the small hole in the bowl of the opium pipe and, being held in the flame of the lamp, the smoke is inhaled and then exhaled through the nostrils. Although the immoderate practice of opium smoking is most destructive to those who live in poverty and distress, it is said that the Chinese in easy circumstances, who are moderate, are not seriously affected as to health and longevity. Individuals of the Western races who become addicted to it carry it to excess and soon show its degrading effects.

The morphine fiend, as the victim of the morphine habit is called, is pale and haggard; he suffers from chronic digestive disturbance, constipation, insomnia, irritability, mental and moral weakness, itching of the skin, and other disorders. He is habitually untruthful. The habit may be broken by immediate withdrawal of the drug or the dose may be gradually reduced. Careful feeding and absolute control of the supply of the drug are essential.

Opium is undoubtedly the most valuable remedy of the whole materia medica. It is given not only to mitigate pain, to allay spasm, to promote sleep, to arrest vomiting and convulsions, to relieve nervous restlessness, to produce perspiration, and to check discharges from the bronchial tubes and intestinal canal, but it is capable of relieving some diseases in which none of these indications can be distinctly perceived. It is a valuable cardiac tonic, and its action is almost miraculous in some cases of heart disease in which digitalis and other drugs have failed. It is a constituent of many cough mixtures.

Its use is contraindicated in coma, in chronic uræmia, and in chronic diseases unless necessitated by pain which nothing else will relieve, as there is great danger of forming the habit. It is borne badly by children and by some adults. It may be administered by mouth, by rectum, or hypodermically. The best-known preparations of opium in the *United States Pharmacopœia* (in addition to the alkaloids morphine and codeine) are laudanum, paregoric, and the mixture of opium and ipecac known as Dover's powder. Magendie's solution is a watery solution of morphine (16 grains to the ounce) and is not official. Consult: United States Bureau of Insular Affairs, *Use of Opium and Traffic Therein* (Washington, 1906); White, *Materia Medica* (London, 1914); for an historical account, Macht, in *Journal of the American Medical Association* (Chicago, Feb. 6, 1915). See ANTIDOTE; CODEINE; HEROIN; LAUDANUM; MORPHINE.

OPIUM WAR, THE. A war between China and Great Britain which broke out in 1840, resulting from the attempt of China to stop the opium importation from India. Though declared illegal in 1796, the importation of opium about 1840 amounted yearly to £1,500,000. Charles Elliott, the moderate British representative, was superseded by Sir Henry Pottinger, who carried on the war with such vigor that when it ended with the Treaty of Nanking (1842) China opened the treaty ports to foreign trade and ceded Hongkong to Great Britain with an enormous indemnity. See CHINA.

OP′ODEL/DOC (of obscure etymology, the first part apparently from Gk. ὀπός, *opos*, juice). A popular synonym for soap liniment. The term was apparently applied by Paracelsus to various forms of liniments or local applications. Soap liniment is composed of common soap, camphor, oil of rosemary, alcohol, and water and is employed as a stimulating application for sprains, bruises, etc. See LINIMENT.

OPON, ō′pōn. A town of Cebú, Philippines, situated on the small island of Mactán, opposite the town of Cebú. There is a monument to Magellan, who was killed here by the natives in 1521. The chief occupations are raising maguey and corn, and fishing. Pop., 1903 (with Córdoba and Santa Rosa), 20,166.

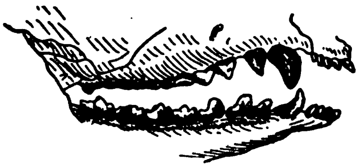
OPOP′ANAX (Lat., from Gk. ὀποπάναξ, *juice* of the plant panax, from ὀπός, *opos*, juice + πάναξ, *panax*, sort of plant, from πᾶς, *pas*, all + ἄκος, *akos*, cure). A gum resin obtained by puncturing the roots of a species of parsnip which grows in Persia (*Pastinaca opopanax*). The ancient physicians valued it highly as an antispasmodic medicine. It is used in perfumery but is practically obsolete in medicine.

OPOR′TO, *Portug. pron.* ụ-pōr′to (Portug. *Porto, O Porto*, the port). The second city of Portugal in population and importance. It is situated on both banks, but principally the north bank, of the Douro about 3 miles from its mouth, in the Province of Entre-Minho-e-Douro, District of Oporto, and 172 miles north by east of Lisbon in lat. 41° 10′ N. and long. 8° 38′ W. (Map: Portugal, A 2). It is a beautifully situated city, being built on an amphitheatre of hills between two rocky headlands extending to the river banks, while on the south side of the river Villa Nova de Gaia (annexed in 1900) enjoys a similar position. Like Lisbon the city rises in a steep incline from the riverside, the houses and gardens being terraced above one another with picturesque effect. The newer portions spread out over the upper slopes and are surrounded by wooded heights dotted with villas. Many of the streets in the older portion of the city are steep, narrow, and tortuous, but on the heights there are several wide avenues commanding fine views of the river and city below and of the ocean beyond. From the heights east of the city two magnificent iron bridges span the river. The first, that of Dom Luiz I (1881–85), crosses the river in a single arch of 560 feet span and carries two roadways, one 33 feet and the other about 200 feet above the river. It is rivaled in size and beauty by few other bridges of the kind in Europe. The second bridge, that of Maria Pia (1876–77), is almost as large as the Dom Luiz I and carries a railroad about 200 feet above the river. The centre of the business section of the city is the low-lying portion around the Praça de Dom Pedro, faced by the city hall on the north and having in its centre a bronze equestrian statue of Pedro IV, Emperor of Brazil (as such Pedro I). From this square the streets lead upward to the hills on either side, which are crowned on the west by the high and slender clock tower (246 feet) of the Clerigos Church (1748) and on the east by the cathedral. This church, originally twelfth-century Romanesque, has fourteenth-century Gothic cloisters and was largely rebuilt in the seventeenth and eighteenth centuries. The most interesting church is São Martinho de Cedofeita, supposed to have been originally built in 559, though very little of the present structure is older than the twelfth century. West of the Clerigos Church is the Jardim da Cordoaría, which, like the other garden plazas of the city, has a luxuriant wealth of mingled southern and northern flora. Still farther west is another park containing the Crystal Palace, a large building erected for the industrial exposition of 1865 and now occupied by a theatre and ballrooms. Among other buildings worthy of note are, besides several churches, the exchange, a handsome building with a central court, and the English factory, an imposing structure built in 1790 and converted into clubrooms for English residents. Oporto is distinctly a modern city, and the commercial and industrial interests predominate. The chief educational institutions are the polytechnic academy, schools of commerce and navigation, a school of medicine, one of philosophy, and several colleges. The municipal library (founded 1833) has 120,000 volumes.

About one-third of the population of Oporto are engaged in manufacturing industries, which are represented by distilleries, sugar refineries, tanneries, and manufactories of woolen, cotton, and silk fabrics, hats, preserved foods and beverages, soap, pottery, corks, tobacco, and jewelry. There are also a number of factories in Villa Nova de Gaia, and here are large depositories for the well-known port wine. The only harbor facilities of Oporto formerly consisted of the quays along the banks of the river, which is here 600 feet wide. The water of the river is deep enough for large vessels, but the mouth is almost closed by a sandy spit prolonged into a bar. To avoid this bar a new harbor was completed in 1892 at Leixões, on the ocean front, 2½ miles north of the river mouth, and connected with the city by a street railway. This harbor is formed by two jetties or breakwaters, each about three-fourths of a mile long and projecting into the ocean so as to form an artificial port with a narrow entrance. The chief exports are wine, oil, olives, raisins, oranges, lemons, onions, cork, salt, cattle, and building materials. Pop., 1878, 105,838; 1890, 138,860; 1900, 167,955; 1911, 194,009, of whom 53,056 males and 41,030 females were able to read.

In ancient times the site of Oporto was occupied by the harbor town Portus Cale, afterward Porto Cale, from which has been derived the name of the Kingdom, Portugal. It was an important city during the supremacy of the Arabs, was destroyed in 820 by Almansur of Cordova, but was restored and peopled by a colony of Gascons and French in 999. During the Middle Ages it was famous for the strength of its fortifications, its walls being 30 feet in height and flanked with towers. In 1808 it was taken by the French, but in the following year it was retaken by an Anglo-Portuguese force under Wellington. In 1832–33 Dom Pedro, the ex-Emperor of Brazil, was unsuccessfully besieged in this city by the forces of Dom Miguel. Consult Sellers, *Oporto, Old and New* (London, 1899).

OPOS′SUM (from the American Indian name; commonly pronounced *'possum*). The opossum (*Didelphis virginiana*) is one of the most distinctive and characteristic of American mammals, for not alone is it found only in America, but it is with a single exception (see MARSUPIALIA) the only marsupial mammal found in the United States, and the family, to which the name "opossum" is now universally extended, does not occur except in America. This family, the Didelphiidæ, is characterized, in distinction from the other marsupials, by numerous (18) small, subequal incisors, the canines larger, the molars with sharp cusps, and the hind feet with the four outer toes subequal, distinct, and having a well-developed, opposable hallux. The tail usually is long, naked, and prehensile. The marsupial pouch is complete in the common opossum, but in most of the family it is rudimentary or wanting. The family includes only one genus besides *Didelphis*, and that is *Chironectes*, which contains the single species *variegatus*, the yapok (q.v.) of South America.


DENTITION OF AN OPOSSUM.

The common or Virginia opossum is widely distributed in the United States. It ranges as far north as southern New York and southern Michigan; southward it extends through Mexico into Central and perhaps South America. The opossum is about as large as a big cat; it has rather short but equal legs and a somewhat pig-like snout. The hair is coarse, of a yellowish tint, the tips of the hairs on the back and sides brownish or blackish, and intermingled with these are larger white hairs. The tail is scaly like that of a rat, but is hairy at the base. The brain is small, but the senses of smell and sight are well developed. The opossum is ordinarily a solitary animal, and except during the breeding two individuals are seldom found together. It is not exclusively arboreal, though fitted especially for such a life. It makes its retreat for the day chiefly in hollow trees, for it is nocturnal in its habits. The young, six to twelve in number, are brought forth in a nest of dried grass and leaves in some hollow in a stump or tree. The embryonic life lasts only about 26 days, when the young are born in a helpless condition and are transferred by the mother to the teats, where they are concealed and protected by the pouch. (See MARSUPIALIA.) They are at this time about the size of young mice, but grow rapidly and at the end of six weeks are large enough to leave the pouch and run about, but for the first few weeks thereafter they return to the pouch for shelter and protection. The food of the opossum is chiefly insects, but almost any available animal food will be used, especially reptiles, and birds' eggs and young. As an article of food the animal is in particular demand among the negroes of the South. Under the stress of capture the opossum has the remarkable habit of simulating death, lying with closed eyes and limp muscles, until an opportunity to escape presents itself. (This has given rise to the expression "playing 'possum.") When so simulating, no amount of handling, kicking, or ordinary abuse will cause the animal to show signs of life, but if tossed into water it realizes its peril and resumes activity with great promptness.

The number of species of *Didelphis* and their geographical limitations are still in doubt, on account of great individual diversity, but there are probably about 20 good species, nearly all smaller than the common opossum and many no larger than rats. Recently taxonomists have shown an inclination to divide the group into several genera. The crab-eating opossum (*Didelphis cancrivora*) is an interesting Brazilian species, which feeds chiefly upon crustacea and is consequently found most commonly in swamps. One of the species from Surinam (*Didelphis dorsigera*) carries the young, after they leave the teats, on the back of the mother, with their tails twined around hers, and this method of caring for the young is common to various other species in which the pouch is rudimentary or wanting. Several of the Peruvian opossums are remarkable from their habit of living mainly upon fruit. Among the smallest species may be mentioned the mouse opossum (*Didelphis*, or *Marmosa, murina*), a little larger than a mouse, bright red in color, and ranging from Mexico through Brazil; and the three-striped opossum (*Didelphis americana*) of Brazil, which is very small and shrewlike, without a prehensile tail, of a reddish-gray color, with three distinct black stripes down the back. The name "opossum" is used in Australia for several mammals of widely different families and not entitled to the name. See Colored Plate of MARSUPIALS, and Plate with CARNIVORA.

OPOSSUM MOUSE. One of the diminutive, mouselike flying phalangers of New South Wales, of the genus *Acrobates*, whose appearance and habits not only, but even its dentition, approach a murine type. It is the smallest of marsupials.

OPOSSUM RAT. A name given to a little marsupial (genus *Cœnolestes*) representing the otherwise extinct Patagonian family Epanorthidæ, rediscovered at the end of the nineteenth century in Colombia and Ecuador. It is of particular interest because with this exception the only marsupials in the New World were those of the family Didelphidæ, which is polyprotodont, while *Cœnolestes* belongs to the diprotodont division of marsupials. Consult Oldfield Thomas, in *Proceedings of the Zoölogical Society of London* for 1895. See MARSUPIALIA.

OPOSSUM SHRIMP (so called because the female carries the eggs in pouches between the thoracic legs). A small, shrimplike marine crustacean of the order Schizopoda and genus *Mysis*. See CRUSTACEA.

OP'OTHER'APY. See ORGANOTHERAPY.

OP'PELN. The capital of a district and a river port in the Province of Silesia, Prussia, on the Oder, 51 miles southeast of Breslau (Map: Prussia, H 3). The church of St. Adalbert is believed to have been founded by Adalbert, Bishop of Prague, in 995. The castle of the dukes of Silesia, dating from the fourteenth century, is situated on an island in the Oder. It also has an excellent town hall and a government building. The educational institutions of the town include a Roman Catholic Gymnasium, a seminary for teachers, and a school of agriculture. There is an historical society. Oppeln manufactures cement, cigars, machinery, kegs, lime, cutlery, lumber, flour, and beer, and trades by river in grain and cattle. From 1288 to 1532 Oppeln was the residence of the dukes of Oppeln. It came into the possession of Prussia in 1742. Pop., 1900, 30,115; 1910, 33,907, chiefly Polish-speaking Roman Catholics. Eduard Schnitzer (Emin Pasha, q.v.) was born at Oppeln.

OPPENHEIM, ŏp'en-hīm, JAMES (1882–). An American writer of novels and short stories, for the most part involving social and ethical problems. He was born at St. Paul, Minn., studied for a time at Columbia University, was a social worker at the Hudson Guild Settlement, and teacher and acting superintendent (1905–07) at the Hebrew Technical School for Girls of New York City. Afterward literary work occupied him primarily. His books are: *Doctor Rast* (1909), short stories; *Monday Morning and Other Poems* (1909); *Wild Oats* (1910), a novel: *The Pioneers* (1910), a poetic play; *Pay Envelopes* (1911), short stories; *The Nine Tenths* (1911), a novel; *The Olympian* (1912), a novel; *Idle Wives* (1914); *Songs for the New Age* (1914); *The Beloved* (1915).

OPPENHEIM, LASSA FRANCIS LAWRENCE (1858–). An international law scholar, of German birth, but long resident in England. He was born at Windekken, Prussia. Educated at Frankfort, Berlin, Göttingen, Heidelberg, and Leipzig, he became privatdocent (1886) and then professor (1889) of law at Freiburg and (in 1891) professor at the University of Basel. In 1895 he settled in England and in 1900 was naturalized. He was lecturer in the London School of Economics and Political Science from 1898 to 1900, when he became Whewell professor of international law at Cambridge. He published: *Die Rechtsbeugungsverbrechen* (1886); *Die Nebenklage* (1889); *Die Objekte des Verbrechens* (1894); *Das Gewissen* (1898); *International Law:* vol. i, *Peace* (1905; 2d ed., 1911), vol. ii, *War* (1906; 2d ed., 1912); *The Science of International Law* (1908); *International Incidents* (1909; 2d ed., 1911); *The Future of International Law* (in German, 1911; English by Bate, 1914); *The Panama Canal Conflict* (1913); Westlake's collected papers (1914).

OPPENHEIM, MAX (ADRIAN S.), BARON VON (1860–). A German explorer. Born in Cologne, where his father was a member of a great banking house, he was educated at the University of Strassburg and as a young man traveled extensively, especially in the Mohammedan countries about the Mediterranean. He explored Morocco in 1886, visited the German colonies in Africa, was German attaché in Egypt in 1896, and in 1899 traveled in Syria, Mesopotamia, and Asia Minor. In 1911 he again visited Mesopotamia, where he had explored Tell-Halaf in 1902. Among his works are: *Von Mittelmeer zum persischen Golf* (1899–1900); *Voyage en Syrie et Mesopotamie* (1899–1900); *Griechische und lateinische Inschriften aus Syrien, Mesopotamien, und Kleinasien* (1905, with Lucas; supplemented by other volumes, 1909 and 1911); *Der Tell-Halaf und die verschleierte Göttin* (1908).

OP'PER, FREDERICK BURR (1857–). An American illustrator and cartoonist. He was born at Madison, Ohio, and after a brief experience in newspaper work, in 1872 he went to New York City. He produced some clever sketches, which he sold to comic papers, and after working a short time in a store devoted himself to drawing as a profession. From 1877 to 1880 he was engaged on Frank Leslie's publications, then served as illustrator for *Puck* until 1899, and thereafter was connected with the New York *Journal*. Opper illustrated the writings of Bill Nye and Mark Twain, Hobart's *Dinkelspiel*, and Finley Peter Dunne's *Mr. Dooley*, and himself published *Folks in Funnyville, Puck's Opper Book; Happy Hooligan* (1902); *Alphonse and Gaston* (1902); *Maud the Matchless* (1907); and other comic sketches. In his journalistic work the drawing is almost elemental, the idea everything; but while lacking the highest artistic and technical qualities, his work is forcefully executed and characterized by fine humor. His cartoons, especially those against the trusts and bosses, were of notable influence in political campaigns.

OPPERT, ŏ'pâr', JULES (1825–1905). A French Orientalist, born at Hamburg. He studied law at Heidelberg, Oriental languages at Bonn and Berlin, and obtained the degree of doctor of philosophy at Kiel in 1847 with a thesis *De Jure Judæorum Criminale*. In 1848 he was elected professor of German in the Lyceum of Laval and in 1850 to the same position at Rheims. His interest in Oriental studies still continued, however, and in 1851 he was appointed a member of the expedition sent by the French government to Mesopotamia. On his return in 1854 he laid his system of deciphering the Assyrian inscriptions before the Institute. In 1857 he was made professor of Sanskrit at the Imperial Library in Paris, in 1869 teacher of Assyriology in the Collège de France, and in 1874 he was elected professor. Among his works are: *Les inscriptions des Achéménides* (1852); *Expédition scientifique en Mésopotamie* (2 vols. and atlas, 1857–64); *Grammaire sanscrite* (1859); *Les fastes de Sargon* (1863); *Histoire des rois de Chaldée et de l'Assyrie* (1866); *Eléments de la grammaire* *assyrienne* (2d ed., 1868); *Documents juridiques de l'Assyrie et de la Chaldée* (1877), with J. Menant; *Le peuple et la langue des Mèdes* (1879); as well as translations of inscriptions and many monographs and contributions to periodicals. He was one of the editors of the *Revue d'Assyriologie*. A list of his articles may be found in Haupt and Delitzsch, *Beiträge zur Assyriologie*, vol. ii (Leipzig, 1891).

OP′PIAN (Lat. *Oppianus*, from Gk. Ὀππιανός, *Oppianos*). 1. A Greek didactic poet, who flourished in the reign of Marcus Aurelius. He was born in Corycus in Cilicia of a wealthy and distinguished family. When the Emperor Verus visited Corycus Oppian's father failed to join in the general manifestations of adulation, and therefore was banished to the island of Melita (Malta). Oppian accompanied him in his exile, and after the death of Verus (169 A.D.) won such favor with Marcus Aurelius by means of his poem in five books on fishing, *Halieutica* (Ἁλιευτικά), in 3500 verses, dedicated to the Emperor and his son Commodus, that the Emperor not only granted him his father's release from exile, but, according to the tradition, paid him a piece of gold for every verse. The poem is written in a smooth but ornate and artificial style, and at times descends to bombast. The high esteem in which it was held in antiquity is to us incomprehensible. Oppian died in his thirtieth year. His native town honored his memory with a statue.

2. To this same Oppian the ancient writer of his *Life* (consult A. Westermann, *Biographi Graeci*, 1845) falsely attributes two other didactic poems, one on hunting in four books, *Cynegetica* (Κυνηγετικά), the other, now lost, on bird catching, *Ixeutica* (Ἰξευτικά). But it is clear from internal evidence that the *Cynegetica* was not written by the poet of Marcus Aurelius' time, for it is dedicated to the Emperor Caracalla and apparently was composed in 212 A.D.; furthermore, the author speaks of his home as Apamea in Syria; and, finally, the metrical structure is inferior to the careful elegance of the *Halieutica*. The *Ixeutica* is possibly preserved in a paraphrase by a certain Dionysius. The best edition of the *Halieutica*, *Cynegetica*, and the paraphrase is by Lehrs, in his *Poetæ Bucolici et Didactici* (Paris, 1846). The *Halieutica* was edited by P. Boudreaux (Paris, 1908). There is an English translation of the *Halieutica* by Draper and Jones (Oxford, 1722) and of the *Cynegetica* by Mawer (London, 1786). There is a French translation of the *Halieutica* by E. J. Bourguin (1877). Consult also Ausfeld, *De Oppiano et Scriptis sub eius Nomine Traditis* (Gotha, 1876).

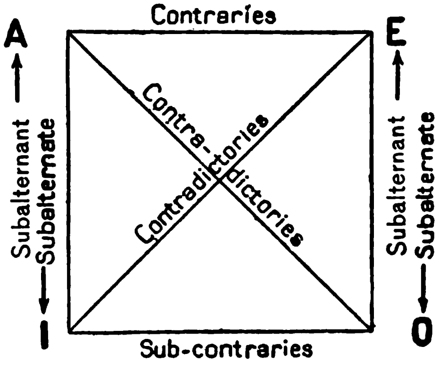
OP′PIUS, CAIUS. A Latin writer. He was an intimate friend of Julius Cæsar, and in conjunction with L. Cornelius Balbus managed all affairs at Rome during the Dictator's absence in Spain. He wrote biographies, not now extant, of Cæsar, Cassius, and Scipio Africanus the Elder, and was regarded by some as the author of the continuation of Cæsar's *Commentaries*, the *De Bello Alexandrino*, *De Bello Africano*, and *De Bello Hispaniensi*. (See Suetonius, *Cæsar*, 56.) This theory, however, is untenable as to the last two, and improbable as to the first. Consult Nipperdey, *De Supplementis Commentariorum Cæsaris* (Berlin, 1846), and M. Schanz, *Geschichte der römischen Litteratur*, vol. i, part ii (3d ed., Munich, 1909).

OPPOLZER, ŏp′pōl-tsẽr, JOHANN VON (1808–71). An Austrian physician. He was born at Gratzen, Bohemia, and studied medicine in Prague, where he practiced for some time and where in 1841 he became professor in the medical clinic. For two years he was professor of special pathology and therapy in Leipzig, and in 1850 was called to the university at Vienna, where his name contributed much to the fame of the medical faculty. He was widely known as a clinicist and for his opposition to nihilism in therapeutics. His *Klinische Vorträge* (1866–72) were edited by Stoffella. He was the father of Theodor von Oppolzer.

OPPOLZER, THEODOR VON (1841–86). An Austrian astronomer, son of Johann von Oppolzer. He was born in Prague. In 1866 he became docent and in 1870 professor in the University of Vienna. In 1884 he began his important studies on the pendulum. His earlier research had been on the orbits of planets and comets. His publications include: *Ueber die Bestimmung einer Kometenbahn* (1868–72); *Lehrbuch zur Bahnbestimmung der Kometen und Planeten* (1870–79), the best and most complete work of this kind; *Syzygientafeln für den Mond* (1881); *Entwurf einer Mondtheorie* (1886); *Kanon der Finsternisse* (1887), with tables of eclipses of the sun between 1207 B.C. and 2163 A.D.

OPPOSITION. In logic, the name applied to express the relation between propositions which have the same subject and the same predicate but which differ in quality or in quantity or in both. Thus, "All cows ruminate" and "Some cows ruminate" stand in opposition or are opposites, because they have the same terms ("cows" and "ruminate") but differ in quantity. If opposites differ only in quantity the universal proposition is called the subalternant and the particular the subalternate. When the opposites differ only in quality and are both universal they are said to be contraries; if they are both particular and differ only in quantity they are said to be subcontraries. If the opposites differ in both quantity and quality they are said to be contradictory. These relations are generally represented graphically in the so-called square of opposition, in which the symbols A, E, I, O, stand for the four mutually opposing propositions.

From this square probably arise the expressions "squarely contradictory" and "diametrically opposite." An immediate inference by opposition is made when from the known or granted truth or falsity of any proposition the truth or falsity of its opposites is inferred. Thus, if A be true, E and O are false and I is



true. These inferences are so obvious that further treatment of them is unnecessary. See LOGIC.

OPS. See REGIA; SATURN.

OP′SONIN (Gk. ὄψον, *opson*, seasoning, sauce). A medical term denoting a substance, surmised to exist in the blood serum, which renders microörganisms foreign to the body palatable to the phagocytes (q.v.). Certain opsonins are thought to exist normally in the blood serum and to act as a stimulus for the phagocytes in all microscopic invasions, while others are produced for certain occasions and will then act upon special microörganisms only. The theory of opsonin is based upon Metchnikoff's (q.v.) studies in phagocytosis, which through the experiments of Sir Almwroth Wright (q.v.) and others led, in 1900, to vaccine therapy, based upon the opsonic index. The opsonic index is a figure representing the ratio of power of absorption of bacteria by leucocytes in the blood serum (phagocytic index) under normal as compared with pathological conditions. In certain bacterial diseases the appetite of the phagocytes will be increased by injecting dead bacteria of the attacking species into the blood, thus raising the opsonic index, i.e., the recuperative power of the body.

OP′TIC, OLIVER. See ADAMS, WILLIAM TAYLOR.

OP′TICAL GLASS. See GLASS.

OPTICAL ILLUSION. See ILLUSION.

OPTICALLY ACTIVE SUBSTANCES. See LIGHT, *Rotation of the Plane of Polarization.*

OP′TIC AXIS. See LIGHT.

OPTIC NERVE. See EYE.

OPTIC NEURITIS (from ὀπτικός, *optikos*, of or for sight, and νεῦρον, *neuron*, nerve + -ῖτις, *-itis*). Inflammation of the optic nerve may be (1) papillitis, in which the optic disk is affected, or (2) retrobulbar neuritis, in which the disk is but slightly involved and the changes are in the nerve fibres behind the eye. In papillitis both eyes are usually involved, most frequently as the result of brain tumor, meningitis, abscess of the brain, or hydrocephalus. Syphilis is a common cause, and less frequently acute febrile affections, general diseases, and inflammations in the region of the eye. The only subjective symptom is impairment of vision. The ophthalmoscope (q.v.) shows a condition known as choked disk, in which the optic disk is swollen, its edges indistinct and fringed, the veins dilated and tortuous, or less projection of the disk and involvement of more of the surrounding retina. The inflammation runs a chronic course and may terminate in recovery or be followed by atrophy of the nerve with consequent loss of sight to a varying degree. Retrobulbar neuritis may be acute or chronic. The former is rare and results from rheumatism, syphilis, disease of the accessory nasal sinuses, acute infectious diseases, poisons, and many other causes. There are neuralgia, pain in the eye and near it, rapid loss of sight, while even ophthalmoscopic examination shows little or nothing. Sight usually returns within a few months, but often with a central scotoma; sometimes there is partial or total blindness. The chronic form is usually the result of excessive use of tobacco and alcohol, separately or combined. Both eyes have gradually diminished vision. (See AMBLYOPIA.) If the patient gives up the use of the drug causing the neuritis, complete recovery may occur; on the other hand, there may be partial loss of sight. Consult J. E. Weeks, *Treatise on Diseases of the Eye* (New York, 1910).

OP′TICS. See LIGHT.

OPTIMA′TES (Lat., aristocrats) **AND POPULA′RES** (Lat., democrats). In the politics of later republican Rome, the conservative or aristocratic and the democratic or progressive parties respectively. The *populares* comprised the great body of the people, including not only the proletariat but also many men of wealth, who, however, were generally without personal influence. The *optimates* were the aristocracy and their followers. The two parties perpetuated the old contests between the patricians and the plebeians. In the second century B.C. the *populares* gained great power under Tiberius Gracchus and his brother Gaius, whose drastic measures were, however, nullified at their deaths. From this time until the Empire politics entered less into the controversies of the *optimates* and the *populares* than did the personal ambitions of the leaders. Marius, the leader of the *populares*, was overthrown by Sulla in the name of the *optimates*, and, later on, Cæsar led the party of the *populares* in opposition to the aristocracy, at whose head was Pompeius. See CÆSAR, GAIUS JULIUS; GRACCHUS; MARIUS; POMPEIUS; SULLA. Consult the article "Nobiles" in William Smith, *A Dictionary of Greek and Roman Antiquities*, vol. ii (3d ed., London, 1891); A. H. J. Greenidge, *Roman Public Life* (ib., 1901); F. F. Abbott, *Roman Political Institutions*, p. 438 (3d ed., Boston, 1911).

OP′TIMISM (from Lat., *optimus*, best; connected with *optare*, to choose, *apisci*, Skt. *āp*, to obtain). The name given to the doctrine of those philosophers and divines who hold that the existing order of things, whatever may be its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or which it is possible to conceive. Usually philosophical optimism is based on the theological ground that the omnipotence, perfection, and wisdom of God as Creator guarantee the perfection of His creation. In modern philosophy Leibnitz (q.v.) is the typical optimist. His main thesis may be briefly stated to be that, among all the possible worlds which presented themselves to the infinite intelligence of God, God on account of His goodness selected and gave existence to the best and most perfect, physically as well as morally. The existence of evil, both moral and physical, is explained by Leibnitz as a necessary consequence of the compossibility of traits; i.e., logically, given certain elements certain other elements systematically go with them, as, e.g., two adjacent mountains carry with them an intervening valley. In like manner the highest good logically carries with it as a foil the amount of evil in this actual world. The argument of the optimists has always been in essence identical with that of Leibnitz. But while historically optimism has supported itself on argument, perhaps the most fundamental basis for optimism has been temperamental rather than theoretical. A joyous, happy nature finds the world on the whole good, and proceeds to explain away the evident evil. Optimism is often loosely used to designate a hopeful attitude towards life. See PESSIMISM.

OPTOM′ETRY (from Gk. ὀπτός, *optos*, visible + μέτρον, *metron*, measure; literally, eye measuring). The science of measuring the accommodative and refractive powers of the eye without the use of drugs. It is defined in various statutory laws regulating the practice as "the employment of any means, other than the use of drugs, for the measurement of the powers of the human vision and the adaptation of lenses for the aid thereof." The practitioner of this art is called an optometrist. Optometry is a branch of ophthalmology, and the usual methods employed by physicians in making visual tests are used, viz., test cards having graduated letters or symbols, the trial case of assorted lenses, the ophthalmometer, ophthalmoscope, skiascope, phorometer, etc. The ophthalmoscope and ophthalmometer are described under these titles. The skiascope, or retinoscope, is a small circular mirror, plane or slightly concave, which reflects a beam of light into the pupil of the eye. Slight horizontal or vertical movements of the instrument produce a shadow which travels across the pupil in the same or in an opposite direction to the movement of the skiascope, according to the state of the refraction. The examiner looks through a small circular opening in the centre of the mirror. Trial lenses are now placed before the eye until one is found which neutralizes or reverses the direction in which the shadow moves. This lens indicates the refractive condition at a particular meridian and enables the examiner to ascertain the amount not only of corneal but also of lenticular astigmatism. The phorometer is an instrument consisting essentially of prisms mounted in a frame, by which the strength and balance of the external muscles of the eye may be determined.

The new profession originated in the desire of so-called refracting opticians (as distinguished from dispensing opticians) to place their art upon a higher and more scientific plane. With this end in view they organized themselves into a separate body, adopted the name of optometrists in 1904, and soon secured recognition and statutory regulation, the first optometry law being passed in Minnesota in 1901. Since that time 30 other States have enacted similar laws, as have the Canadian provinces of Quebec, Manitoba, and Saskatchewan. A similar law was enacted in Tasmania. License to practice optometry is granted by State boards of examiners. The requirements vary in different States. The New York State board requires that an applicant be at least 21 years of age, that he shall have had a preliminary high-school training of not less than two years, and shall give evidence of having studied optometry for several years or of graduation from a recognized school of optometry. A two-year course in optometry, in connection with the department of physics, was established at Columbia University in 1910, at Ohio State University and at the University of California in 1914. Schools for the exclusive study of the profession are also to be found in Boston, Rochester, Philadelphia, and Los Angeles. There are estimated to be about 15,000 optometrists in the United States and Canada.

Under the stimulus of legislation optometry as a science has rapidly developed, and improved instruments for the examination of the eye, as well as many advances in the adaptation of lenses to correct visual errors, have been introduced. Students are now thoroughly grounded in the science of optics as a preliminary to the examination of the eye. While no attempt is made to teach diagnosis and treatment of eye diseases, and while dilation of the pupil with drugs is forbidden by law, the student is taught to distinguish between mere refractive errors and pathological conditions of the ocular tissues. All the processes connected with the manufacture of lenses are also studied.

Consult: Prentice, "Ophthalmic Lenses," "Prism Dioptry," and other papers (1900); Cross, *Dynamic Skiametry in Theory and Practice* (1911); Eberhardt, *Economics of the Ocular Muscles* (1914). Several optometrical periodicals are published, among the more prominent of which are the *Keystone Magazine of Optometry*, the *Optical Journal and Review*, the *Optometrist and Optician*, and the *Optometrical Record*.

For a description of the anomalies of refraction, see ASTIGMATISM; EYE, *Physiology;* SIGHT, DEFECTS OF; VISION.

OPUNTIA, ō-pŭn′shĭ-ȧ. A genus of cacti. See PRICKLY PEAR.

OPZOOMER, ŏp′zō′mĕr, CORNELIS WILLEM (1821–92). A Dutch philosopher and jurist, born at Rotterdam. He studied at the University of Leyden, became professor of philosophy at the University of Utrecht in 1846, and in 1861 was chosen president of the Royal Academy of Science. He was a leader of the empirical school of philosophy. Among his works, which number nearly 100, are: *Het burgerlijk wetboek* (1850; 3d ed., 1858); *De weg der wetenschap* (1851); *Dc waarheid en haar kenbronnen* (1862); *Het wezen der kennis* (1863; 2d ed., 1867); *De gods dienst* (1864–67); *Het burgerlijk wetboek verklaard* (1865–82); *De Bonapartes en het recht van Duitschland, ook na Sédan* (1871); *Scheiding van Kerk en Staat* (1875); *Onze godsdienst* (1875).

OQUAS′SA TROUT (North American Indian name). The blueback trout, or quasky, of the Rangeley Lakes, Me. See Plate with TROUT.

OR (Fr., gold). In heraldry (q.v.), the metal gold, represented in engraving by an indefinite number of small dots.

ORACH, ŏr′ach (formerly also *arrach*, from Fr. *arroche*, from Lat. *atriplex*, orach, from Gk. ἀτράφαξυς, *atraphaxys*, orach), *Atriplex*. A large genus of plants of the family Chenopodiaceæ, some species of which are common weeds in gardens and waste places throughout Europe and the United States. Garden orach, mountain spinach (*Atriplex hortensis*), an annual native of some parts of Asia, with thick greenish or reddish, slightly acid leaves, was formerly much cultivated as a substitute for spinach. Sea orach (*Atriplex littoralis*), a native of the British coasts, and *Atriplex patula*, a garden weed, are similarly used. The sea orach is sometimes classed as a variety of *Atriplex patula*.

OR′ACLE (Lat. *oraculum*, from *orare*, to speak, from *os*, mouth). The place where a deity gives responses to the inquiries of votaries, or the response itself. The belief that the gods could and would reveal the future was common among the nations of antiquity, and few undertakings were entered upon without consultation of those who were able to interpret the signs by which the future was manifested. The kings of Egypt, Babylonia, and Assyria sought divine advice or sanction before their campaigns; among the Hebrews the high priest made use of the Urim and Thummim to determine the will of Jehovah. The Greeks and the Romans were fully convinced of the importance of signs and omens and the need of their correct interpretation, as well as of the possibility of predicting the future by means of various methods, which are treated under Divination; Auguries and Auspices. While consultation of the gods was thus possible anywhere, there were certain places especially chosen by the gods as seats of answer to human inquiries, and these places, called oracles, played an important part in ancient life. They were naturally connected with sanctuaries, and the answers were usually imparted or interpreted by the priests. The number of such oracular shrines was very great, and most of them doubtless enjoyed little more than a local reputation. Only a few reached a national or international importance, but these may fairly be taken as typical. They fall naturally into three classes: (1) those in which the answer was given through signs; (2) those in which the god spoke through the mouth of some inspired person; (3) those in which the god manifested his will by dreams or visions in the sanctuary.

In the first class belongs the very ancient oracle of Zeus at Dodona (q.v.) in Epirus, where answers seem at first to have been given by the rusting of the leaves of the sacred oaks, though later other methods of divination, including the lot, were also employed. At Olympia (q.v.) the family of Iamidæ, in whom the prophetic gift was hereditary, answered inquiries and predicted the future from the sacrifices at the great altar, and a similar method was followed in early times at the oracle of Ismenian Apollo near Thebes. Next to Dodona, and in later times surpassing it in fame, was the oracle of Zeus Ammon (q.v.), in the oasis of Siwah in Libya, noted for the visit of Alexander the Great, who was there hailed as the divine son of Ammon. It was, however, frequently consulted by Greeks in earlier times. The answers were determined by the swaying of the image of the god as it was carried in solemn procession on the shoulders of the priests. At some places the answer was given by casting lots or by throwing dice bearing characters or numbers, which were interpreted by the priests or by a key. Thus, at Attaleia in Phrygia the numbers referred to a collection of oracles in verse, and the answer was sought in the verses indicated by the number.

Oracles of the second class were far more numerous and seem to have been prevailingly oracles of Apollo, for this god was the special minister of Zeus in declaring the future. Here belongs far the most famous of the ancient oracles, that of the Pythian Apollo at Delphi (q.v.). The responses were here given by a prophetess, the Pythia, who, after ceremonial purifications, drank from the sacred water of the Cassotis, chewed leaves of the sacred laurel, and seated herself on the sacred tripod, which was placed in the shrine of the temple over a subterranean chasm from which issued a cold vapor, whose fumes threw her into an ecstasy. The questions were propounded by a prophet, and the mutterings or ravings of the Pythia were reduced by the priests to hexameter verses, and thus communicated to the inquirer. Responses were at first given in but one month each year; later, however, they could be obtained on all but unlucky days. The favorable days were determined by examining the sacrificial victims. The order of the inquirers was determined by lot, unless precedence in consulting the oracle had been granted as a mark of honor by the community. This oracle early attained wide fame, and in the sixth century B.C. received rich gifts from King Crœsus of Lydia. Later it was frequently consulted by Athenians, Spartans, and other peoples before they ventured to decide critical questions of policy, especially in matters connected with religion. In spite of Medism during the Persian wars and some undoubted cases of deception, the oracle maintained its reputation through the best period of Greek history, and with some fluctuations enjoyed prosperity even under the Roman emperors. Other famous oracles of Apollo where inspired prophets or prophetesses revealed the answers of the god were at Branchidæ (q.v.) near Miletus, at Abæ in Phocis, at Claros near Colophon, at Patara in Lycia, and at Argos. The inspiration was in most cases communicated by drinking from a sacred spring or of the blood of a sacrifice.

The third class of oracles finds its best examples in the temples of Æsculapius (q.v.), where the sick who came to consult the god slept in a hall attached to the sanctuary and were either cured by a vision of the god during the night or received directions which were later interpreted to them by the attendants. The most celebrated of these shrines was the Hieron of Epidaurus (q.v.), and the inscriptions found there throw much light upon the character of these establishments. The dream oracles were not confined, however, to the sick. In the sanctuary of Amphiaraus at Oropus in Attica visions not only helped the sick but enlightened the inquirer on other subjects. Before the incubation certain sacrifices and purifications with fasting were required, and fees were of course collected, especially from those who had been cured of disease. Peculiar in many ways, and not above a very strong suspicion of charlatanry, was the procedure at the oracle of Trophonius (q.v.) at Lebadea in Bœotia. After prolonged preparatory rites and sacrifices the inquirer, a honey cake in each hand, descended by a ladder into an artificial subterranean chamber, where he thrust his feet through a hole in the side wall. He was then seized by some unseen power and borne below the earth, where by apparitions or voices the future was revealed, and he then found himself hurried feet foremost into the chamber he had left, whence he was removed by the priests in a dazed and bewildered condition. By Lake Avernus, near Cumæ, in Italy, was a celebrated oracle where the future was revealed by the spirits of the dead, and we hear of other places where necromancy was practiced, either by calling the spirits in person to answer the inquirer or by means of dreams.

As it was believed that many of the great prophets of the past had predicted the distant future, there were also in circulation in the ancient world many collections of oracles attributed to Bacis, Musæus (q.v.), Orpheus (q.v.), and other famous seers, and these predictions were freely cited at any time of national calamity or consulted for guidance in difficulties by the less educated.

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Müller's *Handbuch der klassischen Altertumswissenschaft* (Munich, 1898); Schömann-Lipsius, *Griechische Altertümer*, vol. ii (Berlin, 1902); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906); L. R. Farnell, *Cults of the Greek States*, vol. iv (Oxford, 1907). See also Sibylline Oracles.

ORACLES, The Sibylline. See Sibylline Oracles.

ORAN, ō-rän′, *Fr. pron.* ō′räɴ′. A department of Algeria, sometimes called the Department of the West, from the fact of its forming the western frontier of the country. It is bounded on the north by the Mediterranean, on the east by the Department of Algiers, on the west by the Empire of Morocco, and on the south by the desert. Area in 1914, 25,651 square miles. Pop., 1901, 1,107,354; of the reorganized department, 1911, 1,230,195. Besides the capital, Oran (q.v.), the seats of arrondissements are the communes of Sidi bel-Abbès (pop., 1911, 30,942), Mostaganem (pop., 23,166), Mascara (pop., 24,254), and Tlemcén (pop., 39,874).

ORAN (Ar. *Waran*). A seaport and Roman Catholic episcopal city of Algeria, capital of the department of the same name. It stands at the inner extremity of the Gulf of Oran, an inlet of the Mediterranean, 261 miles by rail west-southwest of Algiers (Map: Africa, D 1). The town, girt by walls and defended by strongly armed forts, is situated at the foot of Jebel Murjajo (1900 feet). The ravine of Oued Rekhi, laid out with boulevards and buildings, divides the port and what was the old Spanish town on the west from the modern French town on the east. The streets and promenades are generally spacious, the houses elegant and airy. The principal edifices are the Château-Neuf (1563), the residence of the general of division; the departmental offices, including the Hôtel de la Préfecture, the civil, criminal, commercial tribunals, etc.; the Grand Mosque in Rue Philippe; the Roman Catholic cathedral (1839); and the barracks. The city has a college, primary and native schools, a geological and archæological society (which has a fine museum of antiquities), Protestant and other churches, synagogues, mosques, a branch of the Bank of Algeria, exchequer, post, and telegraph offices, a military hospital, with accommodations for 1400 beds, and various splendidly appointed magazines and government stores. The town has a good water supply. Formerly vessels had to find shelter in the roadstead of Mers el Kebir, 3 miles distant, but the construction of moles since 1887 has improved the harbor; the new or outer harbor, begun in 1905 by the French government for naval purposes, has a depth of 30 feet. In 1912 there were entered at the port 1662 vessels, of 1,670,866 tons, and cleared 1516, of 1,401,612 tons. There is a large trade with interior Africa and with Spain, Almería being only 140 miles and Gibraltar 220 miles distant. The exports include agricultural produce, iron ore, and alfa. The country in the vicinity is bare and arid, although the land is not sterile. To the south of the town the country is uncultivated, but towards the southeast highly cultivated lands are seen. Cattle are raised, and grain, tobacco, and cotton are grown. The vine covers large tracts of land and its cultivation is attended with great success; the wines produced are of good quality.

The town of Oran was built by the Moors. It was taken by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1732. In October, 1790, it was destroyed by an earthquake, and, after being besieged by the Bey of Mascara, was altogether abandoned by the Spaniards in 1791. Oran was taken by the French in 1831, and has been developed by them into a large and prosperous town. In 1832 Oran had about 3800 inhabitants; in 1891 the population of the commune was about 75,000; in 1901, 87,801; in 1906, 100,499; in 1911, 123,086; the agglomerated municipal population in 1911 was 116,845, of whom 99,481 were returned as Europeans.

ORANGE, ō′räɴzh′. The capital of an arrondissement in the Department of Vaucluse, France, in a fertile plain, near the left bank of the Rhone, 18 miles north of Avignon by rail (Map: France, S., J 4). There are several notable Roman remains here and in the vicinity. The triumphal arch, 60 feet high, is celebrated for the beauty of its architecture and its richly sculptured bas-reliefs. The ancient theatre of Hadrian, the largest of its kind in France, has been restored and is again used for popular spectacles. The church of Notre Dame dates from the eleventh century. Orange has a college and a library. It had a university till the French Revolution. It manufactures silks, muslins, serges, tiles, mosaic, leather, oil, dyes, and brooms. The town is a market for the varied produce of the adjacent territory, including wine, spirits, oils, honey, truffles, and broom corn. Silkworm culture is extensively carried on. Pop. (commune), 1901, 10,303; 1911, 11,087.

Orange is the Roman Arausio. It was the capital of the independent Principality of Orange from the eleventh century. On the death of Philibert of Chalon in 1530 the estates and title passed to the house of Nassau. William of Orange, surnamed the Silent, and his son, Maurice of Nassau, founded the greatness of the house of Orange by the rôle which they played in the foundation of the Dutch Republic. (See Nassau; Netherlands.) William III, Prince of Orange and King of England, died in 1702 without issue; and at the Peace of Utrecht (1713) the King of Prussia, one of the principal claimants to the principality, ceded the territory of Orange to the King of France. The title Prince of Orange is now borne by the heir presumptive to the Dutch throne.

OR′ANGE. A city in Orange Co., Cal., 31 miles southeast of Los Angeles, on the Atchison, Topeka, and Santa Fe Coast Line (Map: California, H 9). It contains a Carnegie library and has canneries and fruit-packing plants. The surrounding region is adapted to poultry raising and the growing of grapes, apricots, walnuts, oranges, and lemons. Orange owns its water works. Pop., 1900, 1216; 1910, 2920.

ORANGE. A town in New Haven Co., Conn., 7 miles southwest of New Haven, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, C 4). It contains a public library. The town is engaged chiefly in farming, but there are some industrial interests, including the manufacture of automobiles, ribbons, and buckles. Pop., 1900, 6995; 1910, 11,272; 1914 (U. S. est.), 13,094.

ORANGE. A town, including several villages, in Franklin Co., Mass., 86 miles west by north of Boston, on Millers River and on the Boston and Maine Railroad (Map: Massachusetts, C 2). It has a public library and three attractive parks—Butterfield, Brookside, and Goddard. The town is actively engaged in manufacturing, the products including sewing machines, sewing-machine needles, shoes, lumber products, clothing, tapioca, tools, water wheels, and other kinds of machinery. The water works are owned and operated by the town. In 1783 Orange was created out of parts of Warwick, Athol, Royalston, and New Salem, and incorporated as a district. In 1810 it became a town. Pop., 1900, 5520; 1910, 5282.

ORANGE. A city in Essex Co., N. J., 4 miles northwest of Newark, on the Delaware, Lackawanna, and Western, the Erie, and electric railroads connecting with Newark, Montclair, Bloomfield, East Orange, South Orange, and other towns of the vicinity (Map: New Jersey, D 2). It is situated at an elevation of from 150 to 200 feet, near the base of First (Orange) Mountain, a great ridge of trap rock, which extends for many miles in a northeast and southwest direction rising to a height of over 600 feet above tidewater. Among the picturesque spots in the neighborhood are Llewellyn Park of 750 acres (West Orange), with many fine residences; Eagle Rock, on the east brow of the mountain, now a part of the new public park system of Essex County; and Hemlock Falls (South Orange), situated amid wild scenery. The city is noted as a residential place, having the homes of many New York and Newark business men, and from its elevated suburbs commands magnificent views of the surrounding country. In the city and vicinity are many miles of excellent roads. The noteworthy buildings include the Stickler Memorial Library, Columbus School Building and Theatre, Decker Building, Metropolitan Building, Orange Theatre, Orange Memorial Hospital, with the Shepard pavilion and a training school for nurses, Orphan Home, House of the Good Shepherd, Masonic Temple, and the First Presbyterian Church, originally built about 1719 and several times remodeled. The city has a public library, a bureau of associated charities, a well-known Mendelssohn Union, a New England Society, Essex County Hunt and Essex County clubs, other athletic and social clubs, and a good system of public and private schools, noteworthy among the latter being the Dearborn-Morgan School for Girls and the Carteret Academy, for boys. Orange is widely known also as the seat of an extensive hat-manufacturing industry. Other products of its mills are lawn mowers, beer, pharmaceutical supplies, etc. Adjoining Llewellyn Park is the Edison laboratory, which was destroyed by fire on Dec. 9, 1914, but rebuilt rapidly. The loss was estimated at about $5,000,000. The government, under a revised charter of 1879, is vested in a mayor, biennially elected, and a council. The city owns and operates its water works and an electric-light plant for municipal lighting only. Pop., 1890, 18,844; 1900, 24,141; 1910, 29,630; 1915 (State census), 29,805.

Orange, originally a part of Newark and called the Newark Mountain, was probably settled as early as 1666 or 1667. In 1718 the settlers established a separate church and called it the Mountain Society. This in 1781 became the Second Church of Newark, and still exists as the First Presbyterian Church of Orange. In 1806 Orange was separated from Newark and incorporated as a town under its present name, the name Orange Dale having been in use from about 1791. In 1872 it was chartered as a city. Out of Orange were created South, West, and East Orange in 1861, 1862, and 1863 respectively. Consult Whittemore, *The Founders and Builders of the Oranges* (Newark, 1896), and Wickes, *History of the Oranges from 1666 to 1806* (Newark, 1892).

ORANGE. A city and the county seat of Orange Co., Tex., 22 miles east of Beaumont, on the Sabine River, with a 26-foot channel to the Gulf of Mexico, on the Intercoastal Canal, and on the Orange and Northwestern and the Texas and New Orleans railroads (Map: Texas, F 4). It is especially noted for its extensive lumbering interests, and is also an important shipping centre for the rice, cotton, and live stock of the vicinity. Lumber, paper, rice, and oil mills constitute the principal industrial establishments. Orange possesses the Lutcher Memorial Church, an edifice of unusual beauty. The water works are owned by the municipality. Pop., 1900, 3835; 1910, 5527.

ORANGE (OF. *orenge*, Fr. *orange*, from It. *arancia*, *arancio*, from Ar. *nāranj*, orange, from Hind. *nārangī*, from Skt. *nārañga*, *nāgarañga*, orange; influenced by popular etymology with Fr. *or*, Lat. *aurum*, gold, in allusion to its yellow color; with loss of initial *n* as in *adder*, *apron*, *augur*, *umpire*, cf. dialectic It. *naranza*, *naranz*, Sp. *naranja*, Wall. *neranze*, orange), *Citrus aurantium*. A low-branching, long-lived evergreen tree of the family Rutaceæ. In cultivated orchards it seldom exceeds 30 feet in height. The leaves are oval or elliptical; the blossoms pure white and very fragrant. The fruit is a large, globose, 8 to 10 celled berry, yellow when ripe, and containing a refreshing acid juicy pulp. The orange is used as a dessert fruit and for preserves, marmalade, etc. The principal types of oranges are as follows: *Citrus sinensis*, which includes the common sweet oranges of commerce, of which there are many horticultural varieties; *Citrus aurantium*, which includes the sour, bitter, or Seville oranges, largely used as budding stocks for sweet oranges and for the oil obtained from the rind of the fruit for use in perfumery; *Citrus bergamia*, which includes the bergamot orange, from which bergamot oil is obtained. The species *Citrus nobilis* includes the mandarin and Satsuma oranges and tangerines. These are mostly small early sorts and hardier than sweet oranges. The trifoliate orange, *Citrus trifoliata*, now called *Poncirus trifoliata*, is valuable chiefly on account of its hardiness and compact growth, which makes it a good hedge plant as far north as New York City. It has a value as a stock for the Satsuma variety and the kumquat, rendering them more hardy than when worked on their own roots. Promising hardy hybrids between this and *Citrus sinensis* are being obtained.

The fruit of these various species varies exceedingly in form, size, juiciness of pulp, thickness of rind, etc. Some varieties have very numerous seeds, while others are seedless. The navel orange is so called because of a remarkable development of adventitious cells which at the apex of the orange give the fruit an umbilical mark. The orange is a native of India or southern China, whence it has been distributed by successive stages to all parts of the subtropical world and the warmer temperate regions. It was introduced into Florida and South America by the early Spanish explorers, and now flourishes wild there in many localities. It is cultivated in nearly all the countries bordering on the Mediterranean Sea, and in Portugal, India and southern Asia, Japan, East Indies, Brazil, Mexico, Jamaica, Florida, Louisiana, California, Arizona, Texas, Australia, etc. In the United States the production of oranges was seriously reduced by the severe winter freezes of 1894–95 and again in 1899, which ruined many of the orange groves of Florida. The production in the United States in 1899 was 6,171,259 boxes, or less than one-half as large as in 1889. The thirteenth census shows a rapid recovery and expansion of the industry. In 1909 California produced 14,439,761 boxes and Florida 4,888,929 boxes. In 1914 California shipped 16,500,000 boxes and Florida about 7,500,000 boxes. The value of the orange crop of the United States in 1909 was $17,566,000, of which about three-fourths was produced in California and one-fourth in Florida.

Oranges may be propagated from seed. Some varieties come true or nearly true to seed, but most do not, and so are propagated by budding. They thrive on nearly all kinds of fertile soils and are found in high, dry situations as well as low, alluvial lands subject to occasional overflow. They cannot be grown in situations subject to severe frosts during the growing season. The trees are set in the orchard when about two years from the bud, the distance apart usually favored in California being 10 feet for dwarfs, 18 to 24 feet for semidwarfs, 24 to 30 feet for standards, and 30 to 40 feet for seedlings. Clean, thorough cultivation is practiced during the growing season and irrigation given wherever necessary. Nearly all California orchards are irrigated. Orange trees under favorable conditions continue in bearing to a great age. Blossoms and green and ripe fruit are frequently seen all together on the trees, but the bulk of the crop ripens at about the same time. In harvesting the fruit is usually gathered by hand, being cut off and placed in sacks or cloth-lined baskets. It is kept for a few days in baskets or shallow bins in the packing house for the skins to dry and soften a little, then graded, each fruit wrapped in tissue paper, and packed for market in boxes holding 2 cubic feet each. Boxes hold from 96 to 252 oranges, according to the size of the fruit. Average-sized fruit runs from 176 to 200 to the box. Oranges stand shipment well, and when properly handled sometimes keep for months.

Orange Diseases. The orange, in common with many of the other citrus fruits, is subject to a number of injurious diseases by which the trees are destroyed or stunted in their growth and the fruit injured or rendered unsightly. One of the most widely spread diseases, especially destructive of lemons and sweet oranges, is the foot rot, or mal-di-goma, which is attributed by Briosi to *Fusarium limonis*. It occurs in Florida, California, Europe, and Australia, and, according to estimates, has caused annual losses of more than $100,000 in Florida alone. It may be recognized by copious exudation of gum near the base of the tree, sparse, small yellow leaves and dead small branches, and patches of dry bark which fall off. Other centres appear and the disease spreads until the whole tree is girdled. Removing the soil from around the crown of the tree seems to be the most effective treatment. Overcultivation is to be avoided and good drainage secured. Die back, so named from the dying of the young twigs for several inches from their tips, is a serious trouble in Florida. No variety or age of tree appears exempt from this disease, which seems to be due to malnutrition, resulting in part at least from improper cultivation and improper drainage. The fruit on trees is not abundant, ripens prematurely, and frequently splits, dropping from the tree before ripening. Withholding nitrogenous fertilizers, stopping cultivation, mulching about trees, and thorough drainage have given good results in overcoming this disease. A gummosis of orange and other citrus trees due to *Diplodia natalensis* has been described from South Africa, and it is now known as common in Florida and elsewhere. In California *Pythiacystis citrophora* causes a gumming of the trees. The sooty mold (*Meliola camelliæ*) is a fungus that follows scale and other insects which exude honeydew upon the trees. It covers the leaves and stems, interfering with their functions, and renders the fruit unsalable by the covering of black, almost feltlike mycelium. By destroying the insects with resin washes or by fumigation the excretion of honeydew (q.v.) is stopped and the sooty mold disappears. Not only citrus trees but many others are subject to this pest. Withertip, or anthracnose, due to *Colletotrichum glœosporividea*, causes the young branches to die back for considerable distances. Trees of all ages are subject to attack, and as a result full crops of fruit are prevented. The same fungus attacks the leaves, producing a characteristic leaf spot and often causing the leaves to fall. An orange knot disease caused by *Sphæropsis tumefaciens* was described from Jamaica in 1912. The scab is due to a species of *Cladosporium* which causes warts or scabs on the leaves and fruits, especially of lemons. Thorough spraying with ammoniacal copper carbonate will prevent this disease. At least five applications should be given. A considerable number of diseases of the fruit in addition to the above have been described, many of them being caused by fungi which likewise attack the tree in its various parts. Thorough and repeated spraying will hold many of these diseases in check. See Colored Plate of CITRUS FRUITS.

Consult: Bonavia, *Cultivated Oranges and Lemons of India* (London, 1890); Risso and Porteau, *Histoire naturelle des orangers* (Paris, 1822); "Culture of the Citrus," in *California State Board of Horticulture, Report* (Sacramento, 1902); Mills, "Citrus Fruit Culture," in *California Agricultural Experiment Station, Bulletin 138;* Harcourt, *Florida Fruits* (Louisville, Ky., 1886); Coit, *Citrus Fruits* (New York, 1915); B. Aliño, *Il naranjo* (Valencia, 1900); *Treatise and Handbook of Orange Culture in Florida, Louisiana, and California* (4th ed., New York and Jacksonville, 1892); Bailey, *Standard Cyclopedia of Horticulture* (New York, 1914–15).

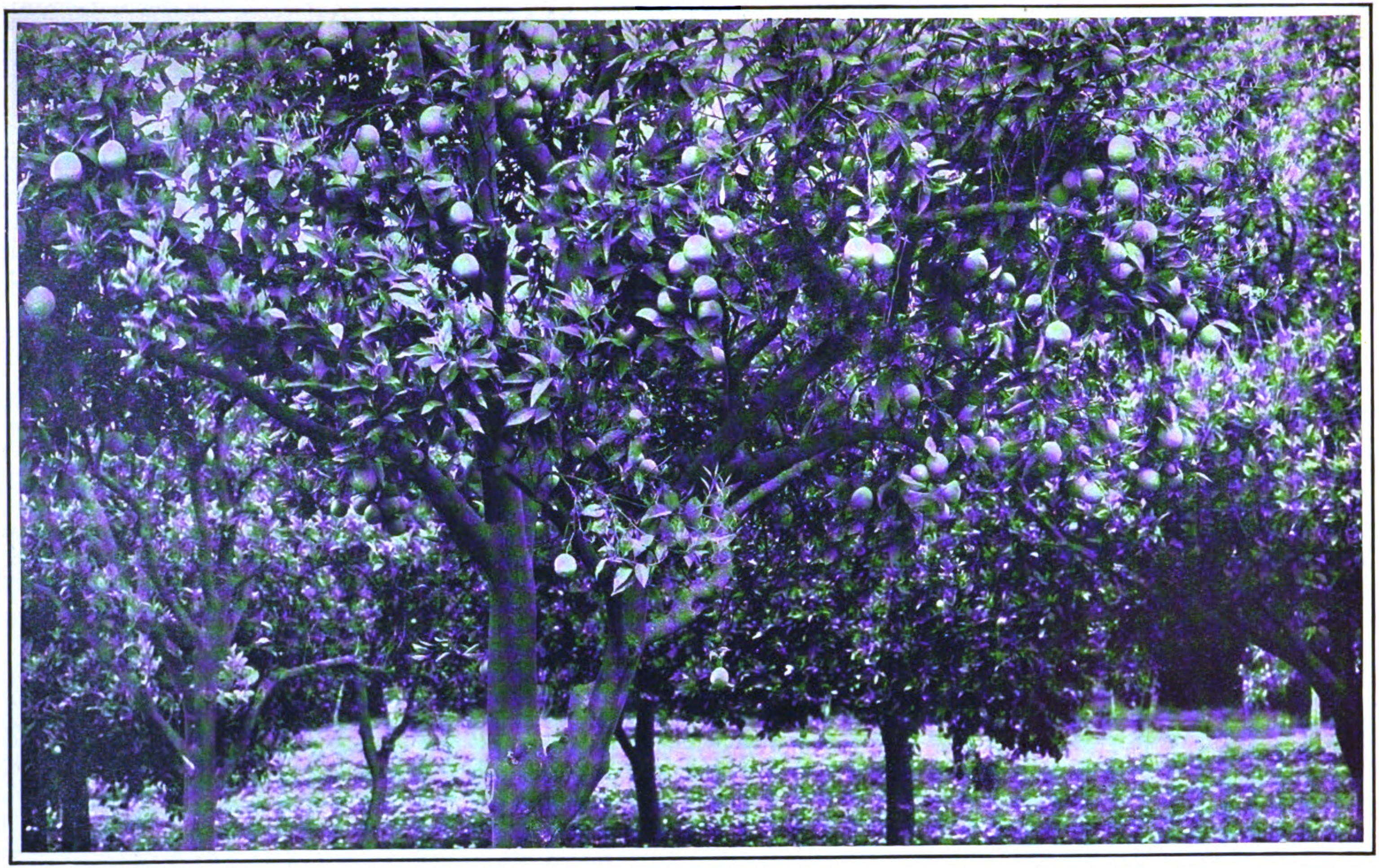
ORANGE, OSAGE. See OSAGE ORANGE.

ORANGE, PRINCE OF. See WILLIAM I, the Silent; WILLIAM III, King of England; FREDERICK HENRY.

ORANGE, VEGETABLE. See MUSKMELON.

OR′ANGEBURG. A city and the county seat of Orangeburg Co., S. C., 50 miles south by east of Columbia, on the north fork of the Edisto River and on the Southern, the Orangeburg, and the Atlantic Coast Line railroads (Map: South Carolina, D 3). It is the seat of

ORANGE



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ORANGE-TREE SEEDLINGS, RIVERSIDE, CALIFORNIA

Claflin University (Methodist Episcopal), for negroes, opened in 1869, and of the State Colored Normal, Industrial, Agricultural, and Mechanical College. There are cotton and cottonseed-oil mills, lumber mills, an ice factory, machine shops, brickyards, fertilizer plants, etc. Orangeburg has a considerable trade in cotton and lumber. The city has adopted the commission form of government. The water works and electric-light plant are owned by the municipality. Pop., 1900, 4455; 1910, 5906.

ORANGE CITY. A town and the county seat of Sioux Co., Iowa, 45 miles north-northeast of Sioux City, on the Chicago and Northwestern Railroad (Map: Iowa, A 2). It has the Northwestern Classical Academy, with the Rapelye Library and the county courthouse and jail. The town is interested principally in farming and stock raising. The water works are owned by the municipality. Pop., 1900, 1457; 1910, 1374.

ORANGE-FLOWER WATER. See ORANGE OIL.

ORANGE FREE STATE, PROVINCE OF THE (formerly the Orange Free State, later the Orange River Colony). A British province in South Africa, lying between the Orange River and its tributary the Vaal. (See accompanying map.) The latter separates the province from the Province of the Transvaal on the north and the former from the Province of the Cape of Good Hope on the south. The latter (Griqualand West) also forms the west boundary, while on the east the province is bounded by Natal and Basutoland. The area is estimated at 50,389 square miles.

Physical Features. The surface is an undulating plateau, lying at an elevation of 3000 to 4000 feet above the sea. The Drakenbergs, with peaks of 7000 to 11,000 feet and passes at 5500 feet, form the eastern boundary of the plateau at the Natal frontier. The plateau slopes mainly westward and northwestward towards the Vaal River. It is for the greater part a prairie country, affording good pasturage in summer, but very sparsely wooded except in the eastern mountains and along the rivers, which are fringed with willows. The province is watered entirely by the tributaries of the Orange and the Vaal. The climate, owing to the high altitude and the dryness of the air, is very healthful and agreeable. A fair amount of rain, 20 inches in the east and 30 in the west, falls during the summer months, November to March. The region is, however, subject to hot winds from the interior, so that the temperature rises actually higher than in the lower ground of Natal, but because of the dryness of the air it is less disagreeable and dangerous. The mean temperature is about 61° F. and the average extremes are: highest 95° F., in January; lowest 40° F., in June. The dominant flora is herbaceous, becoming shrubby towards the west. The large wild animals have entirely disappeared. The country suffers occasionally from the locust plague.

The northeastern portions of the country consist mainly of Triassic sandstones and shales interbedded with horizontal coal seams which outcrop especially in the Kroonstad and Heilbron districts in the extreme north. The southwestern portion belongs to the great south African lacustrine basin, the surface rock being of the Karoo series with intrusions of igneous rocks.

Mining. The mining industry of the province is confined almost entirely to the production of diamonds, which are found at Koffyfontein and Jagersfontein, in the Fauresmith district. They are also found to some extent in the neighborhood of Kroonstad, in the north. During 1912 the average number of persons employed in diamond mining was about 11,500. Considerable progress has been made in the exploitation of the diamond fields, the output having increased from 99,225 carats, valued at £224,000, in 1890, to 259,900 carats, valued at £779,792, in 1904, and to 614,927 carats, valued at £1,483,544, in 1912. There are large coal deposits in the north around Kroonstad. Coal mined in 1912, 639,195 short tons; coal sold, 525,459 tons, the spot value being £141,380. The value of salt produced in 1912 was £31,670; lime, £8274; no output of gold, silver, copper, tin, or lead was reported.

Agriculture and Grazing. The production of cereals is increasing, but agriculture is still of less commercial importance than the pastoral industry. In the year 1910–11 the yield of wheat was 232,591 muids (of 200 pounds each); oats, 633,289 muids (of 150 pounds); corn, 1,788,294 muids (of 200 pounds); potatoes, 199,791 muids (of 150 pounds); tobacco, 807,209 pounds. The 1911 census returned the number of cattle at 1,286,234 (of which, cows 380,956); horses, 220,725; mules, 5995; asses, 11,558; sheep, 8,587,638; goats, 1,048,571; ostriches, 9097; swine, 162,656. Wool produced in the year ended April 30, 1911, amounted to 34,288,370 pounds; mohair, 1,134,264 pounds; ostrich feathers, 3873 pounds; butter, 3,826,977 pounds. Workers on farms in 1911, 122,519 (86,426 males, 36,093 females); of this number 52,925 males and 25,065 females were South African natives.

Railways. At the end of 1912 the state had 1106 miles of railway, with 74 miles under construction and 166 miles authorized. The middle of the state is traversed by a main line running southwest and northeast from the Cape border near Colesberg to the Transvaal border at Vereeniging. This line is crossed at Bloemfontein by a line running from the western border near Kimberley to Harrismith, whence one branch connects with the Natal system, another with Frankfort, and a third with Kroonstad, which is on the main line above mentioned.

Government. The Orange Free State is an original member of the Union of South Africa, established May 31, 1910. There is an elective Provincial Council (25 members), with power to legislate on matters which in general do not affect the Union as a whole. The executive power is vested in an executive committee consisting of an administrator appointed by the Governor-General in Council and four members chosen by the Provincial Council. The state is represented in the Union House of Assembly by 17 members. The capital is Bloemfontein.

Population. The total population (with European or white population in parentheses) has been returned as follows: in 1880, 133,518 (61,022); in 1890, 207,503 (77,716); in 1904, 387,315 (142,679); in 1911, 528,174 (175,189). In 1911 white males numbered 94,488 and white females 80,701; colored males 183,030 and colored females 169,955. The Bantu race was represented by 325,824 persons. The largest town is Bloemfontein, which in 1911 had, with suburbs, 26,925 inhabitants (white, 14,720);

Jagersfontein had 9019 (2067); Harrismith, 6799 (3447); Kroonstad, 5700 (2602). The principal religious denomination is the Dutch Reformed, with 175,311 adherents in 1911; Wesleyans numbered 88,857; Anglicans, 42,401; persons returned as having no religion numbered 173,336, of whom all but 144 were natives and other colored. Primary and secondary education is controlled by the provincial administrator. Fees are commonly charged at all schools; both Dutch and English are taught. There are about 900 government or government-aided schools, with about 30,000 pupils.

History. Before 1836 the region between the Vaal and Orange rivers was a wilderness, inhabited by wandering bands of Bushmen and broken tribes of refugees from the armies of the great Zulu rulers, Chaka, Dingaan, and Maselikutse. In 1836 there was a great emigration of Boers from Cape Colony, owing to dissatisfaction with the British government. This movement, the Great Trek, had Natal for its goal; but, the British not allowing the Boers to remain in possession of this region, a part of them settled in the country north of the Orange and another in the territory north of the Vaal. The republic thus established between the Orange and the Vaal (1842) proved a disturbing neighbor to Cape Colony, so that after some friction it was forcibly annexed by the British in 1848. The country continued in their possession until 1854, when it was formally given up. The independence of the Orange Free State was declared on February 23 and a constitution adopted on April 10, which was revised Feb. 9, 1866, May 8, 1879, and May 11, 1898. About the year 1862 a large number of Griquas (q.v.) sold their farms to the Free State government and migrated in a body to the coast side of the mountains in independent Kaffraria, occupying a large tract of country there known by the name of No Man's Land. In 1866 a treaty was concluded with Moshesh, chief of the Basutos, by which a portion of the territory known as Basutoland was ceded to the Orange Free State. The boundaries agreed on by this treaty were, however, somewhat modified by the Governor of Cape Colony in 1869. The intimate relationship of the Orange Free State and the South African Republic established a community of interests between them whenever local jealousies were put aside, and a party in each state always desired their union, or at least a close alliance. When in 1899 war broke out between Great Britain and the Transvaal, the Orange Free State cast its lot with its sister republic. This was in accordance with a treaty, arranged in April, 1897, for mutual support in case of attacks upon the independence of either. After the first aggressive campaigns of the Boers the Orange Free State was overrun by the tide of British success, and on May 24, 1900, Field Marshal Lord Roberts, commanding the British forces, issued at Bloemfontein, the capital, a proclamation annexing the Orange Free State to the British Empire as the Orange River Colony. The Orange Free State witnessed much of the guerrilla fighting after the formal annexation of the Boer republics had been promulgated; it was repeatedly traversed by British columns in 1900–02, and its President, Steyn, was one of the last to submit to the British. Upon the conclusion of peace, May 30, 1902, the work of restoring the inmates of the detention camps to their homes was actively carried on and was completed by March, 1903. In 1907 self-government was granted and the first election was held in the same year. A large Boer majority was returned. On May 31, 1910, the Orange River Colony was consolidated in the Union of South Africa as the Province of the Orange Free State. See TRANSVAAL; SOUTH AFRICAN WAR.

Bibliography. Norris-Newman, *With the Boers in the Transvaal and Orange Free State in 1880–81* (London, 1882); Johnson, *Africa* (ib., 1884); Keane, *South Africa*, vol. ii (ib., 1895); Theal, *South Africa* (ib., 1899); Struben, *Notes on the Geological Formation of South Africa and its Mineral Resources* (ib., 1897); Bryce, *Impressions of South Africa* (ib., 1897); Norris, *The South African War* (ib., 1900); Wright, *Thirty Years in South Africa* (ib., 1900); Creswicke, *South Africa and the Transvaal War* (Edinburgh, 1900); Keane, *The Boer States: Land and People* (London, 1900); De Wet, *Der Kampf zwischen Bur und Brite* (Leipzig, 1902); id., *Im Kampf um Südafrika* (Munich, 1902 et seq.); A. S. and G. G. Brown, *Guide to South Africa* (London, 1909).

ORANGE INSECTS. The insects which affect the orange also, as a rule, affect the lemon and other trees of the genus *Citrus*. The most important and injurious are the scale insects of the family Coccidæ, which attack the leaves, twigs, branches, and trunk. The long scale (*Mytilaspis gloveri*) and the purple scale (*Mytilaspis citricola*) were for a long time the principal insect enemies of the orange groves in Florida, but the Florida red scale (*Aspidiotus ficus*) and the chaff scale (*Parlatoria pergandei*) have become numerous and injurious. In Louisiana the chaff scale has been the principal enemy, although the purple scale has done some damage. The orange chionaspis (*Chionaspis citri*) also occurs abundantly in this State as well as in Mexico and the West Indies. In California none of these species are noted as pests in the orange groves, although the purple scale and the long scale have been accidentally introduced into some localities during the past few years. The principal California scales are the California red scale (*Aspidiotus citricola*), the white or fluted scale (*Icerya purchasi*), and the black scale (*Lecanium oleæ*). The white or fluted scale has been practically exterminated by the introduction of the Australian ladybird (*Novius cardinalis;* see LADYBIRD), and the black scale is more of a pest to the olive orchards than to the orange groves. The California red scale is therefore the only serious scale-insect enemy to the citrus trees of California, and is kept in check by fumigation with hydrocyanic-acid gas and by spraying with the kerosene distillate emulsion. The soft scale (*Lecanium hesperidum*), the hemispherical scale (*Lecanium hemisphæricum*), the Florida wax scale (*Ceroplastes floridensis*), and the barnacle scale (*Ceroplastes cerripediformis*), as well as the common mealy bug (*Dactylopius citri*), are also found in orange groves, but seldom do any great damage. See SCALE INSECT.

A rather serious pest in Florida, and to a lesser extent in Louisiana, is the white fly (*Aleyrodes citri*), which sometimes swarms upon the leaves of citrus fruits, stopping the pores and extracting the sap, and which through its saccharine excretion is also the nidus for the spores of a black smut fungus which further damages both the health and appearance of the trees and fruit. A mite enemy of the orange injures the fruit to some extent, and is especially harmful to the salable value of the fruit. This is *Phytoptus oleivorus*, called the rust mite of the orange and the silver mite of the lemon, since it produces a rusty appearance on orange fruit and a silvery appearance on lemons. The sovereign remedy against these mites is flowers of sulphur added to kerosene-emulsion spray. Another mite which occurs upon oranges, and which is closely allied to the so-called red spider of greenhouses, is the six-spotted mite (*Tetranychus sexmaculatus*). It feeds mainly on the undersides of the leaves, and it is also readily controlled by the use of sulphur in some form. (See MITE.) Some damage is occasionally done to orange trees by termites or so-called white ants, but usually because of some prior damage.

The leaves are injured by the orange aphis (*Siphonophora citrifolia*) and by several sucking bugs, such as the green soldier bug (*Nezara hilaris*) and the thick-thighed metapode (*Metapodius femoratus*). A number of caterpillars feed upon the leaves, the most conspicuous of which is the larva of *Papilio cresphontes*, sometimes known as the orange dog. The saddleback caterpillar (larva of *Empretia stimulea*) and the bagworm (larva of *Oiketicus abbotii*) and several other less prominent lepidopterous larvæ eat the leaves to a greater or less extent, and there are several leaf rollers which also damage the foliage. The cotton stainer (q.v.) or red bug (*Dysdercus suturellus*) punctures the fruit, as does also the leaf-footed bug (*Leptoglossus phyllopus*). A very serious enemy of the orange in Mexico, and one the advent of which is greatly feared by the orange growers of the United States, is the Morelos orange worm or fruit fly, the larva of *Trypeta ludens*. The fly lays her eggs upon the skin of the young orange, and the maggots which hatch from these eggs penetrate the pulp and ruin the fruit. Nearly all of the species just mentioned occur in Mexico and the West Indies, and several of them are found in the orange groves in Mediterranean regions. In South Africa and Australia the orange has a different insect fauna, but the species are allied to those in America and represent practically the same groups.

Consult Hubbard, *Insects of the Orange*, Department of Agriculture (Washington, 1886), and C. L. Marlatt, "The Scale Insect and Mite Enemies of Citrus Trees," in *Department of Agriculture, Yearbook, 1900* (ib., 1901).

ORANGE MELON. See MUSKMELON.

ORANGEMEN. The members of the Irish society called the Loyal Orange Institution. After the battle of the Boyne (q.v.) in 1690 the Irish Catholics, who on account of their Jacobite leanings were oppressed by the English, began to form various semirevolutionary societies. In opposition the Irish Protestants formed the above-named society, the object of which was to oppose Roman Catholicism and to maintain the union of England and Ireland and the Protestant succession to the crown. Though it derived its name from William III (of Orange), who drove out the Catholic James II, it was first definitely established in Ulster in 1795. It extended rapidly, and even had some lodges in England and Canada. Parliament was compelled to check the turbulence of the organization on several occasions, and from 1813 to 1828 it was suspended in Ireland. It had a complex organization, and the grand lodge had a meeting twice a year, in May and on November 5. In Ireland the society has for a long time had no influence, but there are numerous lodges still existing in the United States. July 12, the anniversary of the battle of the Boyne, is Orange Day. Consult Lilburn, *Orangeism: Its Origin, Constitution, and Objects* (London, 1866), and W. E. H. Lecky, *History of England in the Eighteenth Century*, vols. vii, viii (ib., 1878–90).

ORANGE-NASSAU, ORDER OF. A royal order of the Netherlands, with five classes, founded in 1892 in the name of Queen Wilhelmina. It is conferred as a reward for services to the country or to the royal house, and may be given to foreigners as well as natives. The decoration, a blue enameled cross with eight points, surrounded by a laurel wreath, bears the national arms on a blue ground with the legend *Je maintiendrai*, on the reverse a W, with the inscription *God zij met ons* (God be with us).

ORANGE OIL. An essential oil obtained from the fresh rind of the bitter and the sweet orange. The oil is extracted sometimes by distillation, but more commonly by expression, which may be effected under warm water, the oil rising to be skimmed off; or by the sponge process, which consists in pressing the peel of the fruit forcibly against a piece of flat sponge in such a manner as to break the cells, from which the oil exudes and is absorbed by the sponge. The *écuelle* process, used in the south of France, consists in grating the whole fruit in a shallow tinned copper saucer, provided with short knobs or spikes (*écuelle*). A tube leading from the bottom of the saucer serves to draw off the expressed liquid. The oil, which is a pale yellowish liquid, specific gravity 0.846–0.853, consists of over 90 per cent of a terpene called limonene, with small quantities of citral, citronellol, etc. It is produced principally in southern Italy, Sicily, and the south of France. Orange-flower oil (neroli oil) is distilled from the fresh petals of the blossoms of both the bitter and the sweet orange. In the south of France, where these oils are chiefly produced, the former is known as Bigarade and the latter as Portugal. Orange-flower water, the product of the steam distillation, has a specific gravity of 0.870 to 0.880 and contains from 7 to 20 per cent of esters. Orange-leaf oil (Petit grain), originally obtained from immature fruit, is now distilled from the leaves and young shoots of the bitter and the sweet varieties of the orange. The French oil has a specific gravity of 0.885 to 0.900, contains 50 to 85 per cent of esters, and is soluble in three volumes of 80 per cent alcohol. Oils of neroli and Petit grain are exclusively used in perfumery.

ORANGE RIVER (Hottentot *Gariep*, great water). The principal river of South Africa (Map: Africa, F 7). Its farthest head stream rises on the slope of Champagne Castle, a peak of the Drakenberg on the boundary between Natal and Basutoland, about 120 miles from the Indian Ocean. It flows across the continent in a general westward course, first southwestward through Basutoland, then forming in a large bend the south boundary of the Province of the Orange Free State, after which it flows across the northern part of the Province of the Cape of Good Hope, and finally forms the boundary between the latter and German Southwest Africa until it empties into the Atlantic Ocean. Its total length is over 1300 miles. It receives in the upper two-fifths of its course practically all its permanent tributaries, the last and largest of which is the Vaal (q.v.), which is by some geographers considered as the true upper course of the river. Below its confluence with the Vaal the Orange flows through the arid wilderness of the southern Kalahari region and Namaqualand. In the last 500 miles of its course it receives many intermittent streams and several large wadis lead into it, and the volume of the stream is considerably diminished by evaporation. A sand bar blocks the mouth, so that the river is not open to seagoing vessels, but above the bar it is navigable for small vessels. In the wet season the river becomes an impetuous torrent. About 20 miles from its mouth it is completely obstructed by rapids, and farther inland, above its confluence with the Molopo Wadi in southwest Bechuanaland, it forms the famous Hundred Falls or the Great Aughrabies. Here the river descends 400 feet in a course of 16 miles in a continuous series of rapids and cataracts between a confusion of high rocky crags. Near the Vaal confluence the river is used for irrigation, and there remains a great amount of territory which can be utilized by this means. The river received its present name in 1777 in honor of the house of Orange. Consult Chavanne, *Afrikas Ströme und Flüsse* (Vienna, 1883).

ORANGE RIVER COLONY. See Orange Free State, Province of the.

ORANGE RIVER PROVINCE. See Orange Free State, Province of the.

ORANGE ROCKFISH. See Rockfish.

ORANGE ROOT. See Hydrastis.

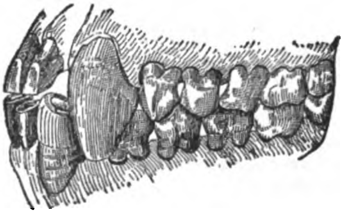
ORANGE STONE. See Oilstone.

ORANGE TIP. Any one of several butterflies of the family Pieridæ, which are usually white in color marked with black and have a conspicuous orange spot at the end of the front wings, the lower surface of the hind wings being mottled with a greenish network. The most noted species in the United States is *Anthocharis genutia*. It is found throughout the southeastern United States, reaching as far north as Connecticut. See Colored Plate of Butterflies, American.

ORANGEVILLE. A town and the county seat of Dufferin County, Ontario, Canada, on the Canadian Pacific Railway, 49 miles northwest (direct) of Toronto (Map: Ontario, F 6). Its manufactures include foundry and machine-shop products, furniture, cement, builders' materials, and flour. Pop., 1901, 2511; 1911, 2340.

ORANG KUBU. See Kubus.

ORANG′-UTAN′ (Malay, man of the woods). One of the three great anthropoid apes (*Simia satyrus*, or according to the most recent taxonomic title, *Pongo pygmæus*). It inhabits Borneo and Sumatra and differs in several important respects from its African relatives, the chimpanzee and gorilla (qq.v.). Its individual features are the height of the skull, the long arms, 9 bones in the wrist and 16 dorsolumbar vertebræ, of which 12 bear ribs. In external appearance the orang is not so human as the gorilla, the reddish-brown hair with which the body is clothed, the long arms, with a very short thumb, and the long slender hands and feet combining to emphasize the resemblance to monkeys. The head is more anthropoid, as the skull lacks the prominent superciliary ridges of the gorilla and is strikingly brachycephalic; moreover, the openings of the nostrils are more pear-shaped than in the other apes. The brain is noticeably like that of man, more so than that of either the gorilla or chimpanzee, as the cerebral hemispheres are much convoluted. The teeth, however, are more apelike than human, for the canines, especially of the male, are strongly developed. The formation of the larynx is extraordinary, as there is a large sac, developed from its united ventricles, which hangs down in front of the trachea. The thumb and big toe are very small and often lack nails, and sometimes even the terminal phalange is missing. The body is bulky and the legs are short and comparatively weak, but the arms are so long that they reach to the ankles when the animal is erect, and are exceedingly muscular. In walking the weight is borne on the knuckles of the hands and the outer sides of the feet, so that neither the palms nor the soles are placed squarely on the ground. Only when assisted by some artificial support do these apes walk on the feet alone. In height the orang is about 50 inches or less, the males being much the larger.



TEETH OF ORANG-UTAN.

These apes are now inhabitants of the swampy forests of Borneo and Sumatra alone, but there is reason to believe that species of this genus formerly inhabited the southeastern portion of the Asiatic continent. They have few natural enemies, of which large serpents and crocodiles are the most important, but even for these the orangs have little fear, nor are they alarmed at the appearance of man. They are arboreal in their habits and rather deliberate in their movements, but are agile and very much at home in trees. They build nests or platforms of branches at a height of 30 or 40 feet from the ground, and there they are said to sleep, being diurnal in habit. The female also brings forth her single young one in such a home, which it is said the male builds for her. Wounded orangs build such shelters for themselves, when escape by flight is impossible. These apes are purely vegetarian in diet, living chiefly on fruit and young, tender shoots, and they rarely have occasion to go to the ground for food. Sometimes, however, they go in search of water and are thus obliged to travel on the earth. They ordinarily go on all fours, but may raise themselves on their feet and, by grasping overhanging branches with their hands, progress rapidly in an erect position. In traveling in this way or from tree to tree they make as much as 5 or 6 miles an hour. They are not gregarious, but are usually found single or in pairs. Though naturally peaceable, they can make a fierce resistance when cornered and compelled to defend themselves. When taken young they can be readily tamed, and are frequently seen in zoölogical gardens.

Bibliography. Hartman, *Anthropoid Apes* (New York, 1886); W. T. Hornaday, *Two Years in the Jungle* (ib., 1885); Forbes, *Monkeys*, in Allen's "Naturalist's Series" (London, 1894);

Ernst Haeckel, *Aus Insulinde* (Bonn, 1901); A. R. Wallace, *Malay Archipelago* (London, 1906); and especially D. G. Elliot, *A Review of the Primates* (New York, 1913). See Plate of ANTHROPOID APES, with APE.

ORANIENBAUM, ô-rä′nê-*en*-boum. A town in the Government of St. Petersburg, Russia, 19 miles west of that city, on the Gulf of Finland, opposite Kronstadt (Map: Russia, B 7). It has a fine palace, built by Menshikov, now belonging to the Grand Duke of Mecklenburg-Strelitz, a summer theatre, many fine villas, a marine hospital, and other benevolent institutions. Its proximity to St. Petersburg, its large park, and its sea-bathing facilities make it a popular summer resort. The place was originally the private estate of Prince Menshikov, and the palace was for some time occupied by Peter III. Pop., 1897, 5300; 1911, 8196.

ORÁONS, ô-rä′ônz. Inhabitants of the west and northwest of Orissa and Chota Nagpur in India, one of the groups of tribes speaking Dravidian languages. They are still a very primitive people. Their dances and marriage customs are of considerable interest. The young people have great freedom in their choice of wives and husbands. The Oráons, or Uráons, call themselves Khurukh, and are also known as Dhangar (mountaineers). Consult: Batsch, "Notes on the Oráon Language," in the *Journal of the Royal Asiatic Society of Bengal* for 1866; Dalton, *Descriptive Ethnology of Bengal* (Calcutta, 1873); Rowney, *The Wild Tribes of India* (London, 1882).

ORA′RION. See COSTUME, ECCLESIASTICAL.

OR′ATO′RIO (It., oratory). A form of music chiefly epic in character, consisting of choruses and soli accompanied by the orchestra, and generally preceded by an instrumental overture. The name is derived from the oratory of churches, where the first performances took place. The full title of such a work was *Rappresentazione per il oratorio.* Gradually the name of the place came to be used for the art form itself. The originator of the oratorio was Philip Neri (q.v.), who, soon after his ordination to the priesthood (1551), began a series of public lectures on Bible history. In order to make his talks more interesting Neri engaged the services of Animuccia, the master of the papal chapel, who composed so-called *laudi spirituali* (hymns) for these lectures. The success of this undertaking was pronounced. After the death of Animuccia no less a master than Palestrina furnished the music. At the beginning these *laudi* had but a loose connection with the subject matter of the lecture, but they soon grew into a kind of mystery with moralizing tendencies. The characters generally were personifications of abstract ideas. The first work of this kind was Cavalieri's *Anima e corpo* (1600), in which the composer makes use of the new kind of recitative that had just then been originated by the founders of the Florentine musical drama (*stilo rappresentativo*). These first oratorios were called *azioni sacri*, and differed in nothing from operas except in choice of the subjects. Even the ballet is introduced. Carissimi (1604–74) banished scenery and acting from these performances. But to compensate he introduced the character of the *historious* (later called *narrator*), a person who sang the narrative portions of the text. Alessandro Scarlatti (1659–1725) introduced the aria into the oratorio, thus relieving the monotony of the purely declamatory style of his predecessors. For the passages assigned to the narrator he wrote *recitativo secco.* Along these lines followed Caldara, Leo, and Stradella.

In Germany the oratorio also developed from the mysteries. The earliest work of this kind is Stephani's *Passio Secundum Matthæum* (1570), but it remained the only one for some time. Not until 1623 do we meet another oratorio, Schütz's *Die Auferstehung Christi.* Whereas the Italian composers favored the new monodic style, Schütz clung to the polyphonic manner to such an extent that the words of a single personage, the Evangelist, were set to a chorus with elaborate accompaniment. His second oratorio was *Die sieben Worte Christi.* The subject matter of these oratorios indicated the direction in which that form was to develop in Germany, for all succeeding composers limited themselves to the story of the Passion of Christ. Thus the oratorio became the passion oratorio, or briefly the passion. In 1704 two oratorios appeared in Hamburg, one by Keiser, the other by Handel, which attracted the attention of other composers, especially Mattheson (1681–1764) and Telemann (1681–1767). These works placed the oratorio upon a higher level than it had attained in Italy. The German masters, while not repudiating the monodic style, worked in the polyphonic style and won great popularity for the new art form by the frequent use of the chorale (q.v.). They even employed phrases of chorales as subjects for the fugues. The way was now prepared for Bach (1685–1750), in whose *Passion according to St. Matthew* the form found its loftiest expression (1729). Into some of the choruses a contemplative element is introduced, consisting of meditations upon the events just narrated. After Bach only one other composer, Graun (1701–59), wrote a passion that has not fallen into oblivion. This was *Der Tod Jesu* (1755).

In Hamburg Handel had written a German passion. Four years later, in Italy, he wrote two oratorios: *Il trionfo del tempo e del disenganno*, an allegorical work entirely after the manner of Carissimi, and *La Resurrezione*, a real Italian oratorio like those of Scarlatti. In 1716 he wrote one other German passion. All these works were only a preparation for his great English oratorios, upon which the fame of Handel (1685–1759) rests, and which to this day mark the perfection of this art form. When the master wrote his first English oratorio, *Esther* (1720), he had completely formed his style. The excellent choruses which were at his disposal in London led him to assign the chief portions of the oratorio to the chorus. And it is just in these numbers that Handel's genius shines most. In the masterly treatment of vocal fugues Handel stands without a rival, as does Bach in his mastery over the instrumental fugue. The chorus is used for various purposes: sometimes it is contemplative, as in Bach's passion, at other times didactic, teaching a moral lesson; then again he uses it in a dramatic manner to mark a climax, and again at times for descriptive or narrative purposes. In the matter of the aria forms Handel does not hesitate to employ all the various kinds in common use then in the opera, even the bravura aria. The recitative is generally the dramatic recitative; the *recitativo secco* is practically banished, for it appears only in very short numbers, and even then with changing harmonies.

His subjects Handel chose from the whole range of biblical history, a proceeding that has been followed by all subsequent composers of oratorios.

At the same time that Handel perfected the oratorio in England this art form rapidly deteriorated in Germany. The baneful influence of the decadent opera affected all forms of sacred music. The oratorio, like the opera, soon consisted of a number of arias or duets, loosely strung together, and served no other purpose than the exhibition of bravura singing. There was practically no difference between the music of an oratorio and an opera. The works of this period have, therefore, very aptly been called concert oratorios. What has just been said regarding the oratorio in Germany applies with equal force to that form in Italy. The oratorio had entirely lost its distinctive traits and assimilated those of the opera. It is not at all surprising, then, that when the reforms of Gluck brought about a change in operatic music some change at once became noticeable in the oratorios. But even the best works of that time have not attracted more than passing attention. The first master since Handel who has written oratorios of sterling merit is Haydn (1732–1809) (*The Creation*, *The Seasons*). But Haydn's style is radically different from Handel's; while the latter's might be characterized as epic, the former's is rather lyric and descriptive. Even the instrumental introductions show the difference between the two masters. Those of Handel are fugal and belong entirely to the polyphonic-contrapuntal style, those of Haydn are descriptive and belong to the homophonic-harmonic style. In Haydn's works the orchestra is a far more important factor than in Handel's. Strictly speaking, only *The Creation* is an oratorio; *The Seasons* is entirely secular in character and really a charming idyl in oratorio form. Spohr (1784–1859) chooses loftier subjects and treats them in an individual manner, although he does not depart from established forms, while the 16 oratorios of his contemporary, Schneider (1786–1853), who enjoyed great popularity during his lifetime, were soon forgotten. The next great master in the history of the oratorio is Mendelssohn (1809–47). His two oratorios, *St. Paul* and *Elijah*, are undoubtedly the greatest works in this form since the days of Handel. On the whole, Mendelssohn follows the principles that guided Bach, for, like the great Leipzig cantor, he insists upon the chorale. The overture to *St. Paul* begins with an instrumental setting of one of the most famous chorales; then follows some fugal writing in which motives from the chorale are skillfully interwoven. The fugal writing in many choruses is more in the manner of Handel. But although Mendelssohn adopted general art principles from his great predecessors, his music preserves throughout its own individuality, so that nothing could be further from the truth than to regard Mendelssohn as an imitator of either Bach or Handel. Liszt (1811–86) also tried his talents in the oratorio (*Christus*, *St. Stanislas*, *St. Elisabeth*), but these works do not mark any distinct phase in the development of the art form. Rubinstein (1829–94), when he found that he was unable to compete with his formidable rival Wagner in the field of dramatic composition, turned his attention to the oratorio. His determined efforts to be original led him to make several attempts to revive scenic representations of the oratorio under the name of sacred opera (*geistliche Oper*). His works in this form, *Paradise Lost*, *The Tower of Babel*, *Moses*, met only with a *succès d'estime*. Not even the idea of sacred opera is original with Rubinstein, for, as we have seen, up to the time of Carissimi oratorios were practically sacred operas. But even much later biblical subjects had been introduced upon the operatic stage, as *Joseph*, by Méhul, and *Mosè in Egitto*, by Rossini. The establishment and rapid development of large and efficient choral bodies at the beginning of the nineteenth century led many composers to cultivate the oratorio. Among these Friedrich Schneider (1786–1853) was the most prolific, and his works enjoyed immense popularity in their day, especially *Das Weltgericht*. Among the most recent composers Father Hartmann (1863–1914) attracted more than passing attention (*Petrus*, *Franziskus*, *Das letzte Abendmahl*).

In France the form of the oratorio never found much favor. Not only have French composers not added to the repertoire of oratorios, but the performances of such works by Handel and other composers are very rare. The first biblical oratorios written in France are those of M. Charpentier (1634–1704), whose works are modeled after those of Carissimi. But he remained isolated for almost a century, when Lesueur (1763–1837) wrote a few short oratorios. The first French oratorio that was heard outside of its native land was *L'Enfance du Christ*, by Berlioz (1854). It only enjoyed a short popularity when after 1870 the Berlioz cult was at its height. Gounod's *Redemption* (1882) and *Mors et Vita* (1885) are probably the most important of the French oratorios, and they have both been given outside of France. The sacred works for the stage written by Saint-Saëns (1835–   ), *Samson et Dalilah* and *Le Déluge*, are constantly performed, both as operas and, without scenic accessories, as oratorios. The elaborate choruses are certainly in true oratorio style. Massenet's *Eve* (1875) and *La Vierge* (1880) and the four-act sacred drama *Marie-Madeleine* (1873) continue the tradition of the French school of oratorio.

Among modern oratorios the *Franciscus* (1888) of Tinel and the *St. Ludmilla* (1886) of Dvořák have attracted considerable attention, while *The Dream of Gerontius* (1900), by Elgar, an English composer, has been accepted by many writers as the finest specimen of English oratorio since the days of Handel. In Italy Perosi (1872–   ) has come forward with a most ambitious work, an oratorio trilogy, the three parts of which bear the titles *Passion according to St. Mark*, *The Transfiguration of Christ*, *The Resurrection of Lazarus*. The composer evidently attempted nothing less than a combination of the art styles of Palestrina, Bach, and Wagner. But if we except the oratorios of Mendelssohn and Tinel it would seem that the nineteenth century has produced no oratorios that are likely to live long. This inability of composers to write successful biblical oratorios led to the establishment of a form that has been called secular oratorio. It is true Handel (*Heracles*, *Semele*) and Haydn (*Seasons*) wrote such works, but these appear to be rather isolated instances and besides attempt to preserve some connection with the real oratorio by occasional religious choruses. Schumann may be regarded as the founder of the secular oratorio. His *Das*

Paradies und die Peri (1843) was the first work in which the form of the oratorio was employed for a purely secular work. To this class belong also Schumann's *Faust* (1853) and *Der Rose Pilgerfahrt* (1851). Next to Schumann the greatest master of the secular oratorio is Bruch, whose *Odysseus* (1873) and *Achilleus* (1885) are frequently performed by the larger choral societies of Germany and England. Of other composers of this form the following are deserving of mention: Gade (*Die Kreuzfahrer*), Vierling (*Der Raub der Sabinerinnen, Alarich*), Lorenz (*Otto der Grosse*), Goldschmidt (*Die sieben Todsünden*), and Benoit (*Die Schelde*). A work sui generis, but most appropriately classed among oratorios, is Brahms's *Ein deutsches Requiem* (1868), a work of loftiest conception. Its character is contemplative rather than epic. A work along similar lines is Taubmann's *Eine deutsche Messe* (1910). See MIRACLE PLAY; MORALITY; MYSTERY; OPERA.

Bibliography. G. P. Upton, *The Standard Oratorios* (Chicago, 1900); A. W. Patterson, *The Story of Oratorio* (New York, 1902); J. Carreras, *El oratorio musical desde su origen hasta nuestros días* (Barcelona, 1906); D. Alaleona, *Studi sulla storia del oratorio musicale in Italia* (Turin, 1908); A. Schering, *Geschichte des Oratoriums* (Leipzig, 1911).

LIST OF IMPORTANT ORATORIOS

Title	Composer	First performance
Achilleus	Bruch	1885
Addolorata L'	Perosi	1901
Apostles, The	Elgar	1903
Béatitudes, Les	Franck	1880
Befreite Jerusalem, Das	Stadler	1813
Bethlehem	Mackenzie	1894
Christmas Oratorio	J. S. Bach	1734
Christus	Drasecke	1905
	Kiel	1874
	Liszt	1866
	Rubinstein	1888
Christus am Olberg	Beethoven	1803
Creation, The	Haydn	1799
Croisade des Enfants, La	Pierné	1905
Crucifixion, The	Stainer	1887
David	B. Klein	1830
Davidde Penitente	Mozart	1785
Deborah	Handel	1733
Déluge, Le	Saint-Saëns	1876
Deluge, The	Cowen	1878
Deutsche Messe, Eine	Taubmann	1910
Deutsches Requiem, Ein	Brahms	1868
Dream of Gerontius, The	Elgar	1900
Eli	Costa	1855
Elijah	Mendelssohn	1846
Enfance du Christ, L'	Berlioz	1854
Enfants de Bethléhem, Les	Pierné	1907
Entrata di Cristo in Gerusalemme	Perosi	1900
Esther	Handel	1720
Eve	Massenet	1875
Fall Babylons, Der	Spohr	1842
Faust	Schumann	1853
Franziskus	Hartmann	1902
Gethsemane und Golgotha	Schneider	1838
Gideon	Horsley	1860
Gustaf Adolf	Bruch	1898
Heilands letzte Stunden, Des	Spohr	1835
Hora Novissima	Parker	1893
Immacolata, L'	Mattioli	1904
In Patris Memoriam	Perosi	1910
Israel in Egypt	Handel	1738
Jephtha	Handel	1752
	B. Klein	1828
	Reinthaler	1856
Job	Parry	1892
Joseph	Handel	1743
Joshua	Handel	1748
Judas Maccabæus	Handel	1746
Judith	Parry	1888
Jüngste Gericht, Das	Spohr	1811
Kain	Zenger	1867
King Saul	Parry	1894
Kingdom, The	Elgar	1906
Lazarus	Rolle	1779
Legende von der heiligen Elisabeth, Die	Liszt	1864
Letzte Abendmahl, Das	Hartmann	1904
Letzten Dinge, Die	Spohr	1826
Liebesmahl der Apostel, Das	Wagner	1844
Light of Life, The	Elgar	1896
Light of the World, The	Sullivan	1873
Lucifer	Benoit	1866
Marie Madeleine	Massenet	1873
Martyre de St. Sébastien, Le	Debussy	1911
Messiah, The	Handel	1742
Moise au Sinai	F. David	1846
Mors et Vita	Gounod	1885
Morwen and the Grail	Parker	1915
Moses	Bruch	1894
	Marx	1850
	Rubinstein	1387
Naaman	Costa	1864
Nal und Damayanti	Bruch	1903
Natale del Redentore, Il	Perosi	1899
Odysseus	Bruch	1873
Paradis Perdu, Le	Dubois	1878
Paradies und die Peri, Das	Schumann	1843
Passione di Cristo	Perosi	1897
Paulus Forschegrund	Schuchardt	1898
Petrus	Hartmann	1900
Prodigal Son, The	Sullivan	1869
Rappresentazione dell' Anima e del Corpo (first oratorio)	Cavalieri	1600
Raub der Sabinerinnen, Der	Vierling	1876
Rédemption, La	Franck	1872
	Gounod	1882
Resurrection, The	Stanford	1875
Rhijn, De	Benoit	1889
Risurrezione di Cristo, La	Perosi	1898
Risurrezione di Lazzaro	Perosi	1898
Rose of Sharon, The	Mackenzie	1884
Rose Pilgerfahrt, Der	Schumann	1851
Ruth	Cowen	1887
	Franck	1846
	Goldschmidt	1867
	G. Schumann	1908
Sacrifizio di Abramo, Il	Cimarosa	1786
Samson	Handel	1742
San Guglielmo d'Aquitania	Pergolese	1731
Saul	Handel	1738
	Hiller	1858
Seasons, The	Haydn	1801
Sieben Worte am Kreuz, Die	Hartmann	1908
Solomon	Boyce	1743
St. Francis	Tinel	1888
St. Ignatius Loyola	Loreto	1622
St. John the Baptist	Macfarren	1873
St. John's Passion	J. S. Bach	1720
St. Ludmilla	Dvořák	1886
St. Mary Magdalen	Stainer	1883
St. Matthew's Passion	J. S. Bach	1729
St. Paul	Mendelssohn	1836
St. Peter	Paine	1873
Strage degli Innocenti, La	Perosi	1900
Theodora	Handel	1749
Three Holy Children, The	Stanford	1885
Tod des Herrn, Der	Hartmann	1905
Tod Jesu, Der	Graun	1755
Transitus Animæ	Perosi	1907
Trasfigurazione di N. S. Gesù Cristo	Perosi	1898
Turm zu Babel, Der	Rubinstein	1872
Verlorene Paradies, Das	Rubinstein	1855
Vita Nuova, La	Wolf-Ferrari	1903
Weihnachtsmysterium	Wolfrum	1899
Weltgericht, Das	Schneider	1819
Woman of Samaria, The	Bennett	1867
Zerstörung Jerusalems, Die	Hiller	1840
Zerstörung von Jerusalem, Die	Löwe	1829

ORATORIO SOCIETY. See CHORAL SOCIETIES.

OR'ATORY (Lat. *oratorius*, relating to an orator, from *orator*, orator, from *orare*, to speak, argue, plead). The art or act of speaking persuasively to an audience, with elevation of thought and sentiment and corresponding expression.

The art of speaking in public in such a manner as to convince and persuade was one of the first to be developed in comparative perfection. Like other attainments of primeval man, it was crude in its early forms. The oldest record of such speech is what might be expected of Methusael's son Lamech, who, having commanded his small audience to hear his voice and hearken to his speech, declares that he will slay a man for wounding him, and cites an historic precedent in justification. It is the earliest type of oratory—the war harangue, either by way of rousing warlike ardor in the tribe or of bragging about heroic deeds, as happens among savages to-day. Similar examples of the war speech occur in the *Iliad* and in Herodotus and Thucydides, all the while growing longer and fuller of form and art with progress in literary cultivation.

After the military address, as of generals to armies, and often with it, other forms began to be evolved as races emerged from barbarism. When a sense of equity and regard for human rights prevailed over despotic might sufficiently to establish tribunals, it became necessary that men should defend their own interests. As these soon began to be sacrificed to the difference in natural ability which prevails in communities, the monopoly of speaking in courts passed to the skilled advocate, who first had written the client's argument for him to deliver in person and who later became his proxy in speaking. Three names mark the progress of this movement in the fifth and fourth centuries B.C.—Corax of Syracuse (c.466), who attempted to make every man his own advocate by furnishing him a blank brief which needed but little variation in filling at a time when the purpose of most litigation was to recover alienated estates; Lysias, who wrote arguments with more reference to the character and rank of the several clients who were to deliver them; and finally Isocrates, who instructed men of native ability in the principles and practice of oratory, into whose hands the business of advocacy at length passed from the unskilled citizen and the professional logographer. In this school of Isocrates the great orators of Greece were trained, and by him eloquence was raised to a height corresponding to that of the contemporary art of sculpture. His own eulogy on Athens was the labor of years, and at the age of 98 he is said to have been still revising and correcting it. It was copied and recited in all Hellenic lands.

To the oratory which arose from the maintenance of personal rights in courts of law another kind was added when government by popular legislation succeeded despotism and deliberative speaking in the assembly followed forensic in the tribunal. This political oratory Isocrates principally taught, and from his school proceeded a group known as the Attic Ten (eight in addition to Isocrates and Lysias), who contributed to the literature of ancient eloquence its choicest examples. At the same time they illustrated several styles which have proved most effective, establishing the truth that excellence is not the sole prerogative of any one of them. Andocides, e.g., represented natural orators, who rely upon native gifts and have a corresponding contempt for rhetorical precepts and methods. As a consequence he was sometimes obscure, irrelevant, and careless in arrangement, carrying his point by keeping in sympathy with his audience, interesting them by anecdotes and by making his plain speech still clearer by abundant illustration, his energy and self-conceit bringing him through difficulties that might have foiled more sensitive speakers. Isæus exemplified a step forward by his skill in arranging his arguments and massing them with cumulative force, without loss of the animation and vivacity which are the dependence of the natural orator. Hyperides used still greater craft in the disposition of his material—a matter of great importance to the ancients—emphasizing his strong points, artfully concealing his art, popularizing his diction with colloquialisms, a general speaker with a variety of graces, witty, sarcastic, playful, and grave by turns. Æschines was a man who did not permit a natural gift of spontaneous eloquence to lead him into the pitfalls of extemporization, but habitually practiced composition, to which he added a careful study of literature, together with such training in delivery as the stage could give. In consequence his speeches were sometimes called greater than himself, too theatrical for reality. This was not the charge against Demosthenes, with whom he had the honor to be associated in the famous case of the Crown, and in whom Attic oratory culminated. Having had its rise in the dialectics of the Sophists and the formal rhetoric of the Sicilian forensics, it took on by turns leading phases in the solemnity of Thucydides, the majesty of Pericles, the stateliness of Antiphon, the plainness of Lysias, the ornateness of Gorgias, the elegance of Isocrates, the artlessness of Andocides, and the vigor of Isæus. All these were aspects of eloquence by which Demosthenes profited. By study of them all he gathered from each the best, making such selection and combination with his own personal gifts as placed him above them all.

These gifts did not at first promise the final achievement. With neither good voice nor commanding presence, short-breathed, defective in articulation, clumsy in manner, Demosthenes on his first appearance in the assembly aroused uproarious and derisive laughter. But he determined to be heard later. He ran up hill, declaimed by the seashore, gestured before a mirror, and learned from actors the outward signs of eloquence. To getting the inner spirit and power were devoted seven years of apprenticeship in speech writing and studies in history and law, politics and economics, with civil cases in courts, until he began to discuss state affairs in the assembly and to assert for Athens her leadership and to rouse her slumbering patriotism. Then there was the ethical element as the basis of all, giving irresistible force to his clear, terse, and direct address. What is honorable for states as for citizens, as distinguished from what is expedient, was the undercurrent of his discourse; so what was best for the whole country rather than what was profitable for his own city. With this main motive underlying the power he had gained by patient toil, he won the primacy in a group not easy to approach. It is not possible to sum up briefly the secret of his surpassing power; but the vast variety which follows exact adaptation to present purpose as related to a final issue covers in a general way the many phases of Demosthenes' eloquence. Like all great masters of art, he could go out of himself to become a part of occasions and opportunities. Losing himself in these, he gained the whole world's tribute of admiration, and his fame still survives as the most eloquent orator of antiquity.

With the decline of liberty Greek oratory began to be imitative, and an age of original production was followed as usual by classification, criticism, and partial reproduction.

Early Roman oratory, like the people, was sturdy and energetic, more practical than imaginative. War, politics, legal and political rights, were controlling ideas. Extension of domain and the sway of law were the main purpose of national life, and public speech took its tone from these sentiments. At first it was martial, to soldiers on the field and to the populace on the return from war, when the victor found eloquence an aid in winning civil honors. The courts, too, were an early training ground for speakers, as also the primitive drama had been in both Rome and Greece, in which lengthening speeches of actors finally outgrew dialogue.

Pristine oratory in Italy was exemplified by Cato the Censor in the first half of the second century B.C. Austere, reserved, morose, as Cato was, his speaking was rude, unpolished, and ungraceful, yet clear, concise, and direct, making him a formidable accuser and a strong defender. Contemporary eloquence was marked by a similar vigor and vehemence unaccompanied by Athenian graces, until the Gracchi dropped early harshness and introduced a milder and freer mode. Their successors, condescending to learn at Athens, began to elevate the art to the eminence attained by Greek genius. Marcus Antonius was master of point and pathos; Lucius Licinius Crassus of perspicuity and the union of brevity with elegance; Cicero reached the height of Roman eloquence.

For 100 years increasing refinement had been adding imported grace to native strength. Cicero, after the custom of his time, sought foreign accomplishments in the rhetorical schools of Greece and Asia. At 40 he was skilled beyond his contemporaries as a forensic and deliberative orator. His excellence lay in harmonious and full development more than in possession of special aptitudes alone. Skilled in all the arts of discourse, like the rhetorician that he was, methodical in arrangement, adroit in treatment of subject and audience, resourceful, versatile, adaptive in discussion; copious, lucid, graphic in diction; flexible, rhythmical, harmonious in style; plausible, felicitous, brilliant in manner; knowing the power of an apposite word and a fitting phrase, always adapting his mood to that of his hearers in order to bring them eventually to his own position—these were Cicero's virtues, ranging over the whole field of oratorical possibilities. Adapting himself to every class of subjects, he also brought himself into harmony with the structure of the Latin language, which required fullness for perspicuity; also into sympathy with Roman taste, which loved the swell and the rhythm, the balance and the cadence of sonorous sentences. His copiousness sometimes runs into verbosity and his elaboration into artificiality; but his customary wealth of diction, solid argument, philosophic sentiments, and fervent declamation captivated his hearers and carried his points by persuasion, if not by conviction. Cicero spoke right onward towards the end and object of discourse, reducing his usual amplification to briefest enumeration, making his speech both clear and stimulating. Better than all else, he possessed the ethical element which is the foundation essential to all effective speaking, an honesty and sincerity which is everything to the unskilled, and without which brilliant eloquence is mere trickery. His aim was to do right; his mistakes were those of his judgment rather than his heart. In a sense his eloquence was complementary to Demosthenes', his acknowledged master. If not so energetic, it was more vivacious, enlivened with a wit which the terribly earnest Greek did not possess. If it did not sweep down throngs with chain shot, there was much display of flash and fire, which pleased by picturesqueness and accomplished the same purpose with superficial hearers, i.e., with the majority. If it was more wordy, the people whom it addressed and the language they used demanded more leisurely thought and more expanded expression; but together these two leaders of speaking men in the two dominant nations of ancient Europe achieved every excellence of oratorical form and manner. What they lacked was not yet revealed—the higher reaches of ethics and a more comprehensive kindness.

When this revelation came, after the decline in eloquence with the loss of liberty that followed Cicero's age, a new spirit seized upon old forms. While Quintilian, the rhetorician, was gathering up the remains of Latin oratory, as Aristotle had done with Greek oratory, a provincial, Paul of Tarsus, was declaring Christianity at Rome and Athens and in the provinces. Later, Athanasius took up its defense and propagation at Alexandria, Chrysostom at Antioch, Basil and the Gregories in other cities, while the Latin Tertullian at Carthage, Ambrose at Milan, and Leo at Rome exemplified the new eloquence and founded a new empire upon the ruins of the old. This eloquence had a freedom and irregularity which could not be restrained within classic bounds, as the new wine could not be kept in old bottles; but it was suited to the work it had to do, and it did it well.

When zeal took on a crusading temper another and wilder style of preaching was addressed to mobile multitudes, starting them towards Palestine by its harangues and keeping them moving by continual exhortation. Such was the oratory of Peter the Hermit. These pilgrimages from the West into the East being over, oratory subsided into the eccentricities of mediæval preaching against which Dante inveighed, angrily declaring that certain priests were bent only on amusing with jests and idle tales, so that their flocks went home fed on wind. The *Exempla* of Jacques de Vitry bear witness, also, to the mediæval, yet not wholly mediæval, appetite for anecdotic sermons. Oratory was once more infused with earnestness at the Reformation; its classic forms were recalled with the rise of great preachers like Bossuet; it reflected the stormy aspects of the French Revolution, and reappeared in its better phases in the parliamentary eloquence of Great Britain in the last half of the eighteenth century.

This was nearest to a repetition of the ancient periods of classical eloquence that has occurred, and one of the results of the revival of Greek learning. The education of deliberative orators like Pitt and Mansfield, Burke and Fox, was chiefly in the oratory of antiquity. From its best examples each gathered such features as were worth most to him—Pitt, simplicity of treatment, luminousness of statement and illustration, enforced by impetuousness of delivery; Mansfield, a statement of his case better than most men's arguments, leading hearers step by step irresistibly to his conclusions; Burke, who combined the study of ancient classics with those of his own country, gaining from both the power of common words effectively placed and of the sonorous sentence when needed; Sheridan, more Asiatic in manner, as Fox was Attic—all of them, and others, too, having their counterpart in men who lived 20 centuries before, a group of statesmen orators whose equals collectively and individually have appeared but once in history, and whose works remain as the second embodiment of eloquence in the records of human speech.

It is not an idle boast to say that a third period is found in the century between 1765 and 1865 in the United States. Questions of Colonial confederation, of independence, of self-government under a constitution, of reserved and delegated rights, of extension or extinction of slavery, of war and reconstruction, formed a series of issues demanding political wisdom and involving earnest discussion, which incidentally trained three generations of orators. Their model at first was British eloquence. The fathers read it and replied to it in a manner to compel the respect and praise of English statesmen. Patrick Henry, Richard Henry Lee, Drayton, and the Rutledges and their compeers in the South, and James Otis, the Adamses, Hamilton, Jay, and their fellow patriots in the North, led the people in the war of ideas and words which preceded the strife of arms. In the Congress of the new nation three men came to the front in the early part of the nineteenth century, who represented as many sections of the country and styles of oratory. Of these Henry Clay was earliest and longest in legislative halls. Frank and bold in nature, honest and sincere in conviction, ardent and hopeful in temperament, he had a rare power of inspiring others with his own sentiments and expectations. His clear and positive views were expressed in lucid terms addressed to the understanding of the people with a freedom and unconstraint that belonged to a new country, and on the floor of Congress his magnetic presence and flowing speech won the hearts of many who could not agree with his political doctrines. He reached more of his countrymen in all sections than any other contemporary, standing as he did on middle ground geographically and politically. An extreme Southern position was held and defended by Calhoun, a man of rigid logic, commanding more respect than enthusiasm, sincere, devoted, persistent; calm and impressive in manner, or vehement and fiery, but relentless in his inexorable demonstration of what he believed to be true. For the North of his day Daniel Webster stood and spoke. Though somewhat academic in his early manner, he found later the value of plain words with plain people and of the best English with everybody. Having a strong grasp of legal principles at the bar and broad views of national questions in Congress, he added perspicuity and energy, vigor of reasoning and felicity of diction to a majesty of voice, presence, and personality which delighted, impressed, and awed assemblies beyond all that the printed pages of his speech can convey. History and tradition alone can prolong his fame.

In the department of occasional addresses, commemorative, eulogistic, and expository, Webster had an eminent successor in Everett, whose eulogy upon Washington is the best example of its kind. The approach of the Civil War gave a fresh impulse to genuine oratory through the magnitude of the issues at stake. In Congress Sumner, whose academic discourse had been heavy as cloth of gold with ancient spoils, now devoted his wide learning, moral force, and commanding eloquence to the cause of unqualified freedom throughout the land. The same demand was made before popular assemblies by Wendell Phillips in his own way and by a manner of speech that for persuading an audience against its will has seldom been surpassed.

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ORATORY. A chamber or building designed for worship of a private or domestic character. From the earliest days of the Christian Church the use of oratories is traceable, and before the regular organization of parishes they had probably a considerable place in the common, although not in the public, worship. Until the middle of the third century A.D. Christians gathered for worship almost entirely in the main hall of some large private house, and when independent church buildings became the rule the service of prayer and even the celebration of the mass were continued, by superior permission, in many houses. One oratory of the third and another of the fourth century have been recently discovered in Rome. The councils of the Church then legislated against the abuse of such private oratories. Another class of oratories were the memorial chapels erected to noted persons, where mass could be celebrated at the anniversary; only prayer at other times. These were usually circular or polygonal in shape, like that of the father of St. Gregory Nazianzus. Oratories took on a different character with the opening of the Middle Ages, and the distinction was more closely drawn between those where prayers alone could be held and those where mass could be celebrated either on certain days or at any time. The papal, episcopal, royal, and feudal castles and palaces were not complete without their chapels or oratories. Oratories for mass were under the strict supervision of the local bishop and required his consecration. The Council of Trent placed them under stringent regulations, which have been enforced and developed by later popes, especially Benedict XIV. During the Middle Ages oratories were attached to monastic, cathedral, and other churches, like the famous San Venanzio at St. John Lateran in Rome.

ORATORY, CONGREGATION OF THE. The name of two religious associations in the Roman Catholic church.

1. The Oratory of St. Philip Neri, the account of whose origin is given in the article on this saint. Unlike most other founders of religious orders he had never committed to writing any definite body of rules for the government of the members; even his scattered papers, from which his intentions might have been collected, had been burned by his orders a short time before his death. Seventeen years after his death the fathers, at the instance of Baronius, who was then superior, compiled from the existing practices and from memory a rule framed so as to embody the spirit of the founder. This was approved by Paul V in 1612. The object of the congregation was to carry on St. Philip's work in his own spirit, and was embodied in "prayer, preaching, and sacraments"; its members are a body of priests living in community, but without monastic vows and under a constitution of a very democratic character. They are at liberty to withdraw at any time and to resume possession of any property they brought with them. There is no general superior; each house is independent, with a superior elected for three years. Seven houses were already in existence at the founder's death; the number increased rapidly and reached 100 in Italy alone, 21 in Spain, 6 in Portugal, and 8 in France, besides others in Europe, South America, India, and Ceylon. The congregation is now reduced to a few houses in Italy and Spain. It took on fresh life in England in the middle of the nineteenth century, when John Henry Newman, soon after his change of religion, established at Maryvale, near Birmingham, a house which was afterward transferred to the town, and later another in King William Street, Strand, London, since transferred to Brompton, near the South Kensington Museum. The English Oratorians, who have mainly been converts, have numbered not a few distinguished men. An account of the London Oratory is given in Bowden, *Life of Frederick William Faber* (London, 1869). The Italian houses also counted many men of eminence in various branches of sacred learning—the great historian Baronius and his continuators, the celebrated explorers of the Roman catacombs, Bosio, Severano, and Aringhi, and the historian Theiner. Consult: Villarosa, *Scrittori Filippini* (2 vols., Naples, 1837–42); F. W. Faber, *The Spirit and Genius of St. Philip* (London, 1850); id., *The School of St. Philip* (ib., 1850).

2. The Oratory of Jesus, a French congregation, founded in 1611 by Pierre (later Cardinal) de Bérulle. As early as 1601 he had conceived the idea of founding a community of priests not bound by monastic vows, and spent a long time in preparation, endeavoring to secure Francis de Sales or César de Bus as its first superior. At the bidding of the Archbishop of Paris he finally undertook the work himself and began the community life with five associates. The new congregation received papal confirmation in 1613, under the name of Oratory of our Lord Jesus Christ, when it already numbered 17 or 18 members. It soon spread through France, and established a house in Rome in 1618. Unlike the Italian Oratory, it was under one superior general, elected for life. The founder, who died in 1629, was succeeded by Père Condren. Under the third general, Bourgoing, who held the office from 1641 to 1662, the Oratory began to be implicated in the Jansenist troubles. Some outspoken Jansenists, such as Quesnel, left the congregation to secure greater freedom of action; but others remained, and in 1711 the superior general, De La Tour, was at the head of the opposition to the constitution *Unigenitus*. (See JANSENISM.) In spite, however, of the drawbacks which this recalcitrant attitude entailed, the congregation had at the outbreak of the Revolution 70 houses, with 751 members, of whom about one-third were priests. Such distinguished men as Malebranche, Massillon, and Thomassin are among its glories. It was practically extinguished by the Revolution, and did not come into full life again until 1852, when it was revived by six men, among them the famous orator Gratry and the future cardinal Perraud, who, after the resignation of the first superior general, Pétélot, became his successor in 1884. It was confirmed anew, with some slight modification of the rule, in 1864. The order suffered in the disestablishment in France, and now numbers only a few members, mostly residing in Paris. Consult: Perraud, *L'Oratoire de France au XVIIème et au XIXème siècle* (2d ed., Paris, 1866); Tabaraud, *Histoire de Pierre de Bérulle* (ib., 1817); A. M. P. Ingold, *L'Oratoire et la Révolution* (Paris, 1885); and the historical memorials of the early days contained in the *Bibliothèque oratorienne* (ib., 1880 et seq.).

ORBAN, HUBERT JOSEPH WALTHER FRÈRE-. See FRÈRE-ORBAN, H. J. W.

ORBEGOSO, ôr'bâ-gō'sō, LUÍS JOSÉ (1795–1847). A Peruvian general, born in the Province of Huamachuco. He was well educated and successfully managed the great estates left by his father, besides gaining some military reputation in the war for independence, to which he devoted his wealth. In 1833 he was chosen President by the Constitutional Assembly and exercised dictatorial powers. Numerous revolts occurred, and Orbegoso, in order to overcome his opponents, asked help from Santa Cruz, then President of Bolivia. Peru and Bolivia were united under the rule of Santa Cruz in 1836, and Orbegoso became subpresident of northern Peru, from which post he was ousted (1837) by a force of independent Peruvians and soldiers from Chile. He was exiled, but returned to Trujillo shortly before his death.

ORBIC'ULOI'DEA (Neo-Lat. nom. pl., from Lat. *orbiculus*, dim. of *orbis*, circle). An extinct genus of hingeless brachiopods allied to and closely resembling the modern genus *Discina*, with which it was formerly considered identical. The shells are thin, depressed, subcircular in outline, with eccentric beaks and concentric growth lines, and they vary from $\frac{1}{10}$ inch to 2 inches in diameter. A slitlike opening in the lower valve served for the passage of a tough muscular pedicle that attached the shell to foreign objects. The genus is represented in all formations from the Ordovician to the Cretaceous in America, Europe, and Asia, and is especially abundant in some shales of Devonian and Carboniferous age.

ORBIGNY, ôr'bē'nyē', Alcide Dessalines d' (1802–57). A French paleontologist, born at Couëron (Loire-Inférieure). He early devoted himself to the study of natural history. In 1826 the Museum in Paris sent him to South America, whence he returned in 1834 with a large collection of notes and specimens. The results of his travels appeared in *Voyage dans l'Amérique méridionale* (7 vols., 1835–49), and in *L'Homme américain* (2 vols., 1840). In 1836 he began the publication of his valuable *Paléontologie française* (14 vols., 1836–60), which was continued after his death by several paleontologists until 1869. In 1853 Orbigny was appointed to the chair of paleontology at the Museum of Natural History, Paris. Among his principal works are: *Galerie ornithologique, ou collection des oiseaux d'Europe* (1836–39); *Mollusques vivants et fossiles* (1846); *Cours élémentaire de paléontologie et de géologie stratigraphique* (1851–52).

ORBIL'IUS PUPIL'LUS (c.113–c.13 B.C.). A Roman grammarian remembered chiefly as the teacher of Horace, who has immortalized him as the flogging (*plagosus*) Orbilius (*Epistolæ*, ii, 1, 71). He was a native of Beneventum, but settled at Rome during the consulship of Cicero, 63 B.C. Consult Suetonius, *De Grammaticis*, 9.

ORBINEY PAPYRUS. See Egypt, *Literature and Science*.

OR'BIS PIC'TUS (Lat., world illustrated). The title of the first successful illustrated manual of instruction for the young and the most popular and widely circulated schoolbook ever issued in Europe. It was published by the celebrated educator Johann Amos Comenius in 1657, has been translated into many European and some of the Asiatic languages, and in various modified forms has continued popular, having been issued in many editions down to recent times. This work can be considered as the beginning of the introduction of object teaching and nature study into school work. See Comenius; Education; Nature Study; Object Teaching.

OR'BIT (from Lat. *orbita*, track of a wheel, course, orbit, from *orbis*, circle). In astronomy, the path described in space by a heavenly body. The paths described by the different planets are of elliptic form and would be true ellipses were it not for disturbing influences of the other heavenly bodies known as perturbations (q.v.). The complete determination of a planet's orbit is of the greatest importance to astronomers, as it enables them to predict the planet's place in the heavens at any period and thus to determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets. For the determination of a planet's orbit it is necessary to know three things: (1) the situation of the plane of the orbit in space, (2) the position of the orbit in this plane, and (3) the situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic (q.v.) is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when its inclination to the plane of the ecliptic (1) and the line of intersection of the two planes (2) are known. The orbit cannot lie wholly above or below the plane of the ecliptic, but must cut it in two points, called nodes (see Node), and the position of the line of intersection, or line of nodes, is generally given in terms of the longitude of the ascending node. The situation of a planet's orbit in its plane is determined when we know its shape (3), magnitude (4), and the position of its major axis or line of apsides (5). The shape and magnitude of the orbit depend upon the length of its major and minor axes, but astronomers prefer to employ the major axis and eccentricity (see Ellipse); and the position of the major axis is known by determining the heliocentric longitude of its perihelion. To complete our knowledge of a planet's motion all we now require are the epoch of its appearance at some determinate point of its orbit, say at the perihelion (6), and the velocity of its motion in its orbit (7), for when this last is known the law of areas as given in Kepler's second law enables us to determine the position of the planet in its orbit at any future period. These seven facts, the possession of which gives us a complete clew to a planet's motion, are called the seven elements (q.v.) of a planet's orbit. What has been here stated concerning the planetary orbits is similarly true of the comets and satellites, though in the case of the latter the effect of disturbing forces is so great as to produce a considerable change of the elements in one revolution. Consult: J. C. Watson, *Theoretical Astronomy* (Philadelphia, 1868); T. von Oppolzer, *Lehrbuch zur Bahnbestimmung der Kometen und Planeten* (2 vols., Leipzig, 1870–79); N. Herz, *Geschichte der Bahnbestimmung der Planeten und Kometen* (2 vols., ib., 1887–94); Bauschinger, *Die Bahnbestimmung der Himmelskörper* (ib., 1905).

ORBIT (of the eye). The eye sockets of man may be described as two quadrilateral pyramidal cavities, situated at the upper part of the face, with their bases outward and their apices directed backward and inward. Seven bones take part in the formation of each orbit, viz., the frontal, sphenoid, ethmoid, superior maxillary, malar, lachrymal, and palatine bones. The three first mentioned, however, enter into the formation of both orbits. Besides containing the eyeball and its muscles, the orbits serve for the transmission of important nerves and blood vessels, being perforated by nine openings which communicate with the interior of the skull. They are lined with periosteum, which is blended at certain points with a dense, fibrous membrane (the capsule of Tenon) which is reflected over the eyeball to the corneal margin and backward over the recti muscles. The space between the eyeball and bone is padded with a variable amount of fat. At the upper external angle is found the lachrymal gland, and at the inner inferior angle the tear sac with its duct leading into the nose. The muscles of the eyelids are attached to the orbital margin. The inner walls of these cavities are in intimate relation with the nasal accessory sinuses, and disease of the latter is easily communicated to the eye. Injuries and inflammations of the orbit are dangerous not only from their destructive possibilities as to sight, but also because they find here an easy pathway to the brain.

ORB WEAVER. A spider of the family Epeiridæ, that spins a wheel-shaped web. The framework of the web is composed of strands of silk that radiate out from the centre like the spokes from the hub of a wheel. When this framework is completed, the spider begins at the centre to spin a spiral line out towards the edge. Whenever the spiral line crosses the spokes it is attached to them. When the outside is reached the spider begins to spin a closer spiral, gradually approaching the centre. While the threads of the first spiral were smooth, those of the last are sticky. These are the snare threads. The threads of the first smooth spiral, which served merely as a stay, are bitten away during the course of the construction of the new sticky spiral. The webs of some of the orb weavers are strengthened by zigzag ribbons, while the webs of other species are not complete orbs.

OR'CA. A killer whale. See KILLER.

ORCA. See PRINCE WILLIAM SOUND, ALASKA.

ORCAGNA, ôr-kä'nyȧ, ANDREA DI CIONE, called (c.1300–68). After Giotto, the foremost Florentine artist of the fourteenth century. He is supposed to have studied first in the workshop of his father, Cione, a goldsmith, and to have passed thence to the studio of Andrea Pisano, who was then at work on the bronze baptistery gates. Perhaps he studied also with Giotto, but Pisano's influence upon his art was decisive. In 1344 he was enrolled in the guild to which painters belonged and in 1352 his name appears among the records of the stonemasons' guild. In 1355 he was named head master of the building of Or San Michele, and in the following year he offered a design for the façade of Florence Cathedral. He was appointed *capo maestro* (head architect) of Orvieto Cathedral in 1358, but resigned, owing to his other duties, in 1360.

Orcagna was one of the most versatile geniuses of all times. He ranked first in his day as sculptor, painter, architect, and goldsmith; he was also reputed a poet. His masterpiece in sculpture is the tabernacle at Or San Michele (1359), a tall structure of mellow-tinted marble, enriched with carvings, mosaic, and sculpture (both statuettes and reliefs), probably the most beautiful product of Gothic sculpture in Italy. In wall painting his chief work, the "Paradise," is in the Strozzi Chapel at Santa Maria Novella; inferior to this are the "Last Judgment" and the "Inferno," the other parts of a trilogy. The façade of the cathedral of Orvieto, much restored and now in part in South Kensington Museum, shows him at his best in the field of mosaic work, as does the altarpiece in the Strozzi Chapel in the field of tempera painting. It is uncertain how far he was assisted by his brother Nardo, to whom the "Inferno" is usually attributed. Orcagna is more spiritual in feeling and more sculpturesque in rendering than Giotto. His figures are more graceful and well proportioned and display tenderness as well as energy of expression. He made great advances in perspective. In sculpture his treatment is more pictorial than Andrea Pisano's, but richer in composition and more naturalistic in expression. He possesses, moreover, a delightful narrative power. Among other paintings of less importance assigned to him are three in the collections of the Yale Art School. Research is also just beginning to distinguish the paintings of his brother Nardo and of Jacopo di Cione, of which there are also good examples in the United States. Modern study has shattered several of Vasari's and other ancient writers' attributions to this master. It is known that he did not build the famous Loggia dei Lanzi at Florence or paint the "Triumph of Death" and the "Last Judgment" in the Campo Santo at Pisa. Orcagna's influence was great, even beyond Tuscany.

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ORCEIN, ôr'sē-in, $C_7H_7NO_3$. An amorphous red coloring matter produced by the action of oxygen and ammonia upon orcin (q.v.). It is freely soluble in alcohol, but only sparingly in water. With metallic salts it yields insoluble colored precipitates (lakes), which are of considerable value in dyeing. Orcein is the chief constituent of commercial archil (q.v.).

OR'CHARD (AS. *ortoeard*, *ortgeard*, Goth. *aúrtigards*, from *ort*, Goth. *aúrti*, OIcel. *urt*, herb; connected with AS. *wurt*, Goth. *waúrts*, OHG. *wurz*, Ger. *Wurzel*, OIr. *frém*, Lat. *radiæ*, Gk. *ῥάδαμνος*, *rhadamnos* + *geard*, Goth. *gards*, OHG. *gart*, Ger. *Garten*, garden; connected with OIr. *gort*, crop, Lat. *hortus*, garden, Gk. *χόρτος*, *chortos*, yard). Any plantation of cultivated fruit trees. The fruits usually classified as orchard fruits include apples, peaches and nectarines, plums and prunes, pears, cherries, quinces, and apricots. These are all deciduous fruits. Plantations of citrus fruits, olives, etc., are sometimes referred to as groves and sometimes as orchards, and the same is true of plantations of cultivated chestnuts, pecans, walnuts, etc. In this article only deciduous fruits are considered. In Europe, especially in Germany and France, much of the deciduous fruit is produced on the fruit trees which line the principal highways. There also large quantities of deciduous fruit are grown on walls, espaliers, and cordons, requiring special pruning and training. Practically every farm in America, more particularly in the Northern States and Canada, contains an orchard for family use. The largest commercial orchards in the world are found in America, where the trees are allowed to grow naturally with but relatively little pruning, and where attention is given to thorough cultivation, spraying, and fertilizing. The total value of the orchard fruits produced in the United States in the census year 1909 was $140,867,347. Of this amount apples represent 59 per cent; peaches, 20 per cent; plums and prunes, 7 per cent; pears, 5.6 per cent; cherries, 5.1 per cent; and apricots, 2 per cent. Among the more striking developments in modern orchard fruit growing are (1) the increased attention given to orchard tillage; (2) the practice of spraying to control insect pests and fungous diseases; (3) fertilizing; (4) thinning; (5) use of small packages in marketing; and (6) the development of cold storage and refrigerator-car transportation.

Formerly the orchard in America was a small adjunct of the general farm. After setting out the trees the orchard was largely left to itself. Occasionally the trees were pruned, but the orchard was seldom fertilized or tilled, and was either left in sod or planted to farm crops. With the increased demand for fruit among all classes of people, greater attention was paid to orchards. In favorable localities they became the most important part of the farm. Gradually whole farms and localities came to be given up to orchards, which in many districts occupy hundreds of square miles.

With the development of the orchard came increased attention to cultural details. Orchards are prepared by deep plowing, subsoiling in heavy lands, and thorough harrowing. After the trees are set they are given as clean cultivation as other farm crops. Hoed crops may be planted between the rows of trees for the first few years, but as the trees increase in size these are more and more restricted to the middle of the rows, until finally when the trees come into bearing the whole space is devoted to them alone. Neither cereals nor tall-growing crops that are likely to shade the trees are sown in the young orchard, nor is the orchard seeded down except under special conditions, as when the trees are growing too rankly and produce little or no fruit. In such cases seeding to cereals, grass, etc., may tend to check growth and throw the trees into bearing. The orchard is plowed in spring as early as the ground can be worked. This is followed by cultivation every week or 10 days until about the middle or last of summer, or until the wood growth of the tree has practically ceased. At the last cultivation a cover crop is sown. If the soil is poor in nitrogen a leguminous crop is used, otherwise some cereal or grass may be sown or the weeds allowed to grow. The object of the cover crop is fully to check the growth of the tree for the season, so that the wood may ripen up well before winter. The cover crop also protects the soil from leaching, washing, and puddling in winter. The following spring the cover crop is plowed under and the summer cultivation repeated. In arid regions irrigation (q.v.) must be practiced. Spraying to check the ravages of injurious insects and plant diseases is considered absolutely essential in American commercial orchards for the production of first-class fruit. (See FUNGICIDE.) The fact that the production of orchard fruits draws on the fertility of the soil in exactly the same manner that wheat, corn, or any other farm crop does, is well recognized, and the orchard is regularly fertilized. Orchards are no longer permitted to bear all the fruit the trees will set, and the limbs no longer have to be propped up to keep them from breaking. Crops thus produced were found to contain too many small and unmerchantable fruits, besides rapidly exhausting the energies of the tree. Especially is thinning practiced with the more expensive fruits, such as peaches, and in many orchards even the cheaper fruits, like apples, are thinned. The thinning is done soon after the fruits attain the size of the end of the thumb.

In the marketing of fruits much more attention is paid than formerly to the convenience of the ultimate purchaser, i.e., the consumer. Small packages which he can conveniently carry home from market are most in demand. (See MARKETING ASSOCIATIONS, AGRICULTURAL.) Cold storage is being employed not only in the main centres of consumption, but in the fruit districts themselves. It makes possible the prolongation of the marketing from a few weeks to, in some cases, as many months, thus lessening the danger from glut on the market, increasing the net returns to the grower, and greatly prolonging the season when fresh fruits may be obtained by the consumer. Refrigerator cars also make possible the transportation of perishable fruits to distant and better markets. See also REFRIGERATION.

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ORCHARD, HARRY (1866–). An American assassin, whose true name was Alfred E. Horsley. He was born in Northumberland County, Ontario, Canada. According to his own confession Orchard committed forgery, arson, bigamy, and murder, and finally, he said, he had become a professional assassin in the employ of the Western Federation of Miners. In December, 1905, he killed ex-Governor Steunenberg of Idaho with a bomb. He was arrested on Jan. 1, 1906, and made a confession appearing to implicate Haywood, Moyer, and Pettibone, officers of the Western Federation of Miners, but they were acquitted by the courts and Orchard was himself convicted and sentenced to death. His sentence was, however, commuted to life imprisonment. Orchard's confession was a matter of controversy, some professing to believe in the genuineness of his repentance, while labor leaders and others asserted that it was only part of a monstrous frame-up to discredit the organized-labor movement. See IDAHO, *History*.

ORCHARD GRASS, COCK'S-FOOT GRASS (*Dactylis*). A genus of grasses, closely allied to *Festuca*, having the panicle of flowers mostly on one side of the stem and the spikelets much crowded into clusters. The common orchard grass (*Dactylis glomerata*), a native of the Northern Hemisphere, grows in tufts in meadows, open woods, etc., from sea level to high altitudes, and is an important natural pasture grass, since it is much relished by cattle, grows with great rapidity after being cut, yields a large quantity of herbage, succeeds well on most soils and in situations too shady for any other grasses. A large improved variety has been introduced into cultivation. It succeeds well in all parts of the United States except in the extreme South and in the arid regions of the West, yields excellent hay abundantly, and is unexcelled by other grasses in its yield of aftermath, but its tendency to grow in tussocks is rather against it. This habit may be prevented to some extent by frequently rolling the ground. It is usually sown mixed with other grasses.

ORCHARD ORIOLE. See ORIOLE.

OR'CHARDSON, ôr'chẽrd-son, SIR WILLIAM QUILLER (1835–1910). A Scottish genre and portrait painter. He was born in Edinburgh and was educated at the Trustees' Academy, where he was influenced by Lauder. After working for seven years in Edinburgh, in 1862 he went to London, where he afterward resided. He became associate of the Royal Academy in 1868 and member in 1877. His earliest subjects were taken from history or literature, but his conception was distinctly pictorial and though romantic the results are never sentimental. Such are "The Queen of the Swords" (1877) and "Hard Hit." With his "Napoleon on Board the Bellerophon" (1881, Tate Gallery) he struck a more profound and dramatic note. Subsequently he often chose his themes from modern life, though almost invariably from that of the upper classes. Orchardson unites æsthetic and intellectual qualities to a rare degree. His draftsmanship is subtle and unerring, his color luminous and delicate. Among his other important works are "Un Mariage de Convenance" (1884–86); "Voltaire" (1883, Hamburg Kunsthalle); "The Salon of Madame Récamier" (1885); "A Tender Chord"; and "Her First Dance," "The First Cloud," and "Her Mother's Voice," the latter three in the Tate Gallery. Orchardson also excelled as a portrait painter, Sir Walter Gilbey, "Master Baby," and Lord Peel ranking among the best British portraits of the century. He was knighted in 1907. Consult the monographs by Armstrong, the *Portfolio* (London, 1895), and Little, the *Art Annual* (1897).

ORCHESTRA, ôr'kĕs-trȧ (Lat. *orchestra*, from Gk. *ὀρχήστρα*, from *ὀρχεῖσθαι*, *orcheisthai*, to dance, from *ὄρχος*, *orchos*, row; connected with Skt. *ṛgh*, to rage). In the Greek theatres the place allotted to the chorus of dancers; in modern theatres the part of the building assigned to the instrumentalists, also the parquet; and in the modern concert room the place occupied by the instrumental and vocal performers. The word "orchestra" is also used to denote the musicians collectively, and especially the instruments on which they play.

The modern orchestra (referring to the instruments) is the result of a long and slow development. Before the seventeenth century composers had employed various instruments in the accompaniment of their vocal works, but in the choice of instruments the composers seem to have been influenced more by chance than by any definite plan. In fact, the manner in which many instruments were treated gives conclusive evidence that their nature and possibilities were not at all understood. The development of the orchestra coincides with that of the opera (q.v.). In the first opera ever performed in public, Peri's *Euridice* (1595), the orchestra consisted of a harpsichord, a lute, a theorbo, a lyre, and three flutes. The function of this combination of instruments was to give the very simplest kind of accompaniment to the dramatic recitative. Claudio Monteverde (1567–1643) was the first to discover the nature and relative value of some of the instruments. Yet the instrumentation of his first opera, *Orfeo* (1607), differs little from that of his predecessors. But his *Combattimento di Tancredi e Clorinda* (1624) shows a consciousness of purpose and is full of original and striking orchestral effects. Here we find for the first time the tremolo of the strings. The strings, in fact, form the foundation of the orchestra. In this work is also found the first instance of pizzicato. Monteverde had discovered that instruments had their own peculiarities and, acting upon this knowledge, he became the inventor of a distinctively instrumental style; whereas his predecessors wrote a truly vocal style for all instruments. Since Monteverde the strings have been regarded as the foundation of the orchestra, and with him the various kinds of viols were employed for this purpose. Alessandro Scarlatti (1659–1725) employed violins, violas, and basses, although their treatment is still very crude. The celli generally played in unison with the basses, but occasionally the violas were treated with freedom and were even divided into two parts. The principal wood-wind instrument was the oboe; bassoons were used only to strengthen the basses. Legrenzi (1625–90) strengthened the violins, so that his orchestra consisted of 20 violins, 2 violas, 2 viole di gamba (the precursor of the cello), 4 flutes, 2 bassoons, 2 cornets, and 3 trombones. About this time the kettledrums also found their way into the orchestra. But the real art of writing for the strings was not yet known; there was no sonority. To render the harmony fuller the harpsichord was used. Even so great a master as J. S. Bach did not know how to use the instruments. He treats them throughout like voices without the slightest appreciation of tonal color. Handel is not much more advanced. This composer scored heavily for the wood wind, but with no other purpose than that of reënforcing the strings. In fact, many of his works were reorchestrated by Mozart, and to-day Handel's works are almost exclusively heard with the instrumental rearrangement of Mozart.

During the seventeenth century only the Italian operatic composers contributed to the development of the orchestra. When opera had gained a foothold in France and Germany we find Rameau (1683–1764) and Keiser (1673–1739) as important factors in the advancement of orchestral technic. Early in the eighteenth century the resources of the strings were pretty thoroughly known. One of the lasting merits of Stamitz (1717–57) and the Mannheim symphonists is the recognition of the immense value of the wood wind. From them Mozart first learned of the wonderful effects of which this group is capable, and through him Haydn was strongly influenced. In 1760 Haydn was appointed director of music to Prince Paul Anton Esterházy. At first his orchestra numbered only 17 instruments—6 violins and violas, 1 cello, 1 double bass, 1 flute, 2 oboes, 2 bassoons, and 4 horns. In order to obtain the best effects from this little orchestra the master directed all his energies to discover and make use of the true nature of the wood wind. In his first symphony (1759) Haydn uses in addition to the strings (the violins being divided into first and second) only 2 oboes and 2 horns. In his last symphony (D major, written in London, 1795) the score calls for 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, 2 horns, kettledrums, and the regular strings. In two of his last works, *The Creation* (1798) and *The Seasons* (1801), Haydn employs 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, 1 contrabassoon, 2 horns, 2 trumpets, 3 trombones, kettledrums, and the strings. Here we have the modern symphony orchestra (which, however, usually has four horns).

Mozart did not add any new instruments. His great merit is the development of the clarinets as permanent orchestral instruments. In fact, Haydn himself admits that he learned the use of not only the clarinets, but of several other instruments, from the considerably younger Mozart. Strange to say, Mozart does not employ clarinets in his *Jupiter Symphony*. In the score of the *G Minor Symphony* the clarinets were added later. In his first two symphonies Beethoven employs the same instruments as Haydn in his last, with the addition of two trumpets. In the *Eroica* (1803) Beethoven separates the celli and basses and introduces a third horn. In all subsequent symphonies the master continues to separate the celli and double basses, but returns to the use of only two horns. In his last symphony, the *Ninth*, the orchestra is considerably increased. This score calls for 2 flutes, 1 piccolo, 2 oboes, 2 clarinets, 2 bassoons, 1 double bassoon, 4 horns, 2 trumpets, 3 trombones, kettledrums, cymbals, triangle, bass drum, and the regular strings. This is the grand symphony orchestra of to-day. All composers since Beethoven (Schubert, Schumann, Mendelssohn, Brahms, Tschaikowsky, Dvořák) have used it, the only addition being the bass tuba as the lowest instrument of the trombone choir. Until Wagner this orchestra served also all purposes of operatic composers. But Weber, though he did not add a single new instrument, opened a new field of almost boundless possibilities, that of tonal coloring. His innovations in the mixing of the different timbres of the several groups constitute a new and most effective means of expression for the dramatic composer.

The modern opera orchestra is still larger and employs many other instruments to obtain special characteristic effects. This colossal combination of instruments was developed by two men almost independently of each other—Wagner and Berlioz. Wagner started with the grand symphony orchestra of Beethoven. Since *Tannhäuser* (1845) the division of violins into four parts has been frequently employed. In *Tristan* Wagner divides the strings into no less than fifteen parts. Since *Lohengrin* (1850) the opera orchestra consists of three of each family of the wood-wind instruments. The number of flutes and bassoons is increased to three; to the two oboes is added the cor anglais (q.v.) (an alto oboe); to the two clarinets the bass clarinet. This increase naturally calls for an increase in the number of the strings. For the *Ring des Nibelungen* Wagner requires 3 large flutes, 1 piccolo, 3 oboes, 1 English horn, 3 clarinets, 1 bass clarinet, 3 bassoons, 1 contrabassoon, 8 horns, 3 trumpets, 1 bass trumpet, 2 tenor trombones, 1 bass trombone, 1 contrabass trombone, 4 tubas (specially constructed for Wagner, 1 tenor, 2 bass, and 1 contrabass), 6 harps, 2 pairs of kettledrums, 1 glockenspiel, bass and snare drums, cymbals, tom-tom, and even tuned anvils. It goes without saying that the number of strings must be in proportion. Wagner demands as a minimum 34 violins (18 first, 16 second). The demands made by Berlioz in his *Requiem* are unique. He calls for 4 flutes, 2 oboes, 2 clarinets, 8 bassoons, 12 horns, 4 cornets, 12 trumpets, 16 trombones, 4 ophicleides, and 8 pairs of kettledrums, and indicates the strength of the strings by demanding 18 double basses. Its highest evolution the orchestra has reached in our own days in the works of Richard Strauss, who calls for four instruments of each family of the wood-wind group. The heckelphone, a baritone oboe, was specially constructed for him. In wealth and variety of tonal coloring he has surpassed even Wagner, but at the expense of the intrinsic merit of the musical ideas.

The constant advance in orchestral technic naturally advanced the skill and efficiency of orchestral players, so that to-day the orchestras of the first rank are in reality nothing less than an aggregation of virtuosos. The average number of performers constituting a modern full orchestra is about 80, distributed as follows: flutes 3, oboes 3, clarinets 3, bassoons 4, horns 4, trumpets 4, trombones 3, tuba 1, harp 1, kettledrums 3, first violins 14, second violins 12, violas 10, cellos, 10, double basses 10. For special occasions monster orchestras of 200 or 300 performers have been brought together, but experience has shown that whatever is gained by such masses in volume is more than counterbalanced by lack of finish. As a matter of statistics showing the growth of musical appreciation in the United States, it may be stated that in the year 1900 there were seven regular symphony orchestras in the entire country. By the end of 1915 the number had increased to 50.

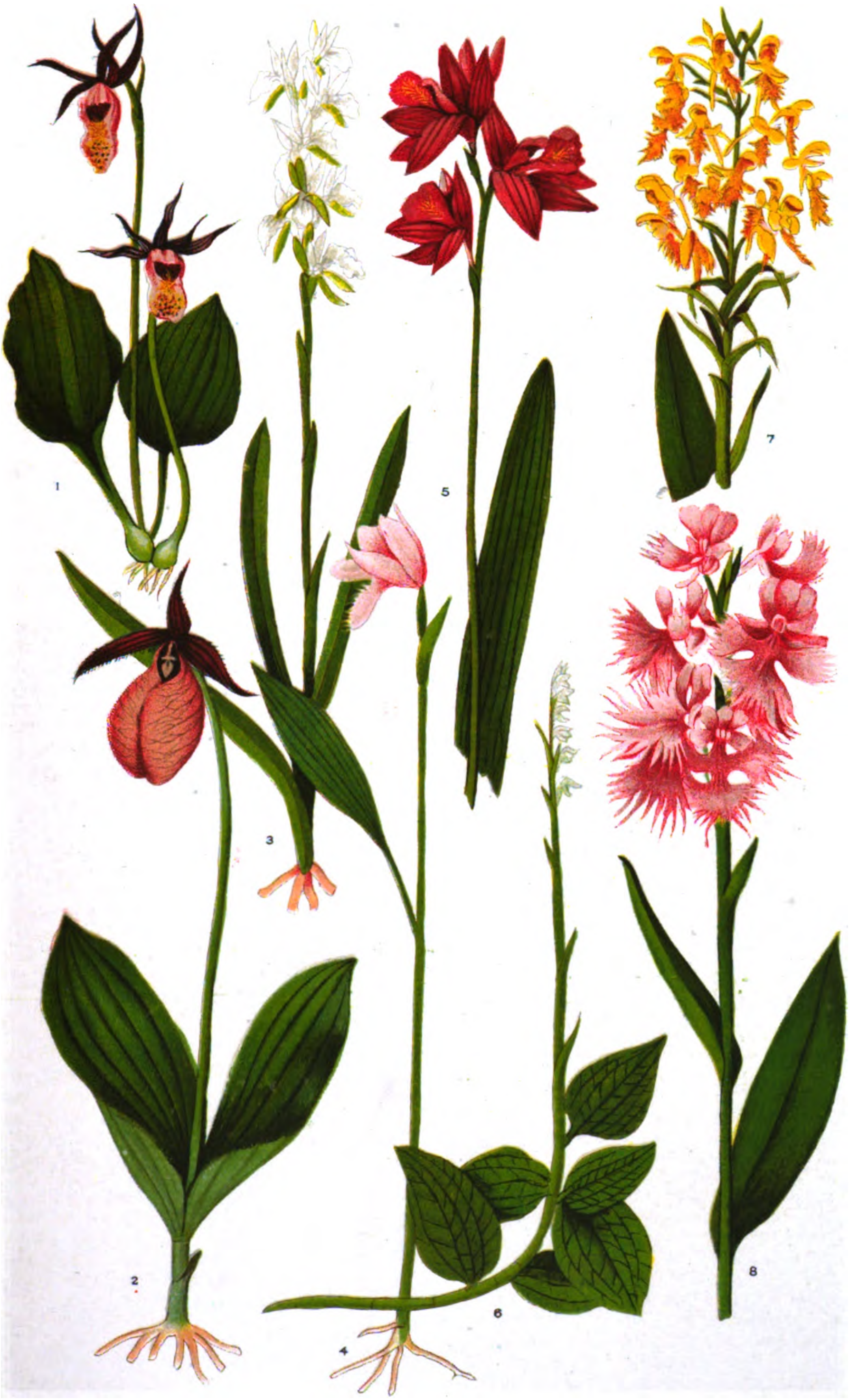
Consult: W. J. Henderson, *The Orchestra and Orchestral Music* (New York, 1899); D. G. Mason, *Orchestral Instruments and what they Do* (ib., 1909); F. Volbach, *Das moderne Orchester in seiner Entwickelung* (Leipzig, 1910); A. W. Patterson, *How to Listen to an Orchestra* (New York, 1913); Cecil Forsyth, *Orchestration* (ib., 1914). See CONDUCTOR; INSTRUMENTATION; SCORE.

OR'CHESTRA'TION. The art of scoring a musical composition for the different instruments of the orchestra. See INSTRUMENTATION.

ORCHESTRION, ôr-kĕs'trĭ-ŏn (from *orchestra*). A mechanical instrument with powerful reed pipes. By skillful devices almost all the wind instruments of the orchestra are imitated. The real inventor is Michael Welte (q.v.), who exhibited his first orchestrion in 1849 in Karlsruhe. The firm of F. T. Kauffmann a little later added some improvements, but this only served to stimulate the original inventor to greater efforts. The substitution, in 1887, by the inventor's son Emil of paper rolls for the large and expensive wooden cylinders and the application of a pneumatic action brought the instruments to their present perfection. To-day they are extensively used in places of amusement instead of an orchestra.

ORCHID, ôr'kĭd (from Lat. *orchis*, from Gk. ὄρχις, testicle, orchid, so called from the shape of the roots). The common name of members of the family Orchidaceæ, which has the most highly organized flowers among monocotyledons. Although beautiful orchids occur in the temperate regions, such as species of *Habenaria* (rein orchis), *Pogonia*, *Calopogon*, *Calypso*, *Cypripedium* (lady's-slipper, moccasin flower), etc., their chief display is in the tropics. There are more than 400 genera and a conservative estimate puts the number of species at 6000, while other estimates increase the number to 10,000 or more. The flowers, which may be solitary, racemed, or spiked, are exceedingly irregular and most elaborately adapted to the visits of insects, a fact discovered by Sprengel in 1793 and more widely proved by Robert Brown in 1833 and later verified in detail by Darwin, Müller, Gray, and others. (See POLLINATION.) The brilliant coloration of the flowers, some of which are fragrant, and their bizarre forms have made them much prized in hothouse cultivation. The most conspicuous structure of the flower is the so-called labellum or lip, which is a part of one of the three petals. This lip is of the greatest importance in attracting insects, guiding them to the nectar, the pollen, and the stigma. In most orchids it is a conspicuous flat and more or less pendent

AMERICAN ORCHIDS



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1 CALYPSO - CALYPSO BOREALIS
2 MOCCASIN FLOWER - CYPRIPEDIUM HUMILE
3 LADIES' TRESSES - SPIRANTHES CERNUA
4 SNAKE MOUTH - POGONIA OPHIOGLOSSOIDES
5 GRASS PINK - CALOPOGON PULCHELLUS
6 RATTLESNAKE PLANTAIN - GOODYERA REPENS
7 YELLOW FRINGED ORCHID - HABENARIA CILIARIS
8 PURPLE FRINGED ORCHID - HABENARIA FIMBRIATA

organ, but in *Cypripedium* (lady's-slipper) it forms a sac which suggests the common name. Another conspicuous feature of the flower is the spur, which is really a prolongation of the base of the labellum and in the bottom of which the nectar is secreted. In a curious Madagascar orchid the spur attains the length of 10 or 11 inches. A prominent technical character of the family is the fusion of the one or two stamens with the style or stigma, forming a central mass called the column. In general also the pollen is not granular, but the pollen grains cling together in one or more masses (pollinia), which are carried away by insects. The fruit is usually a capsule; the seeds are like fine sawdust in appearance, and are so numerous that a single capsule of a *Maxillaria*, it has been estimated, may contain more than 1,700,000. The habits of orchids are almost as varied as their floral structure, and upon this basis they are often grouped under three heads. 1. Some are saprophytes and have lost entirely the green color of independent plants, being usually of a brownish or yellowish hue, as the ordinary coralroots of the United States. 2. Other orchids are epiphytes and are found in the moist atmosphere of tropical or subtropical regions. On account of the special food reservoirs which they develop they are distorted-looking plants, in general resembling coarse bulbs with not very attractive leaves, but their flowers are often exceedingly brilliant. Among the epiphytic orchids two forms of roots are developed—clinging roots, by which attachment is secured, and aërial roots, which hang down to absorb water for the plant. 3. The third group comprises the terrestrial orchids, among which are some of the largest and many of the most prized forms. Orchids are found in all parts of the world except the coldest and the most arid, but are most numerous in the humid forests of the torrid zone, and especially in Mexico and Central and South America, which furnish such well-known genera as *Cattleya*, *Odontoglossum*, and *Oncidium*. *Calypso borealis* ranges in British America as far north as lat. 68°.

Fully 3000 species are under cultivation, while the hybrids and varieties are innumerable. In the United States, including Alaska, there are about 75 species, distributed in 20 genera, and of these, seven or eight, belonging to the genus *Epidendrum* and found in Florida and other Gulf States, are epiphytes, all the other species being terrestrial. Few genera except *Salep* and *Vanilla* have a commercial value aside from culture as ornamentals. The prevailing colors of orchids are rose, lilac, yellow, white, and green. The odor of some species resembles that of violets or orris root. Of North American orchids a number are very striking, especially *Arethusa bulbosa*, *Pogonia ophioglossoides*, the purple, the white, and the yellow fringed orchids or habenarias, and the showy, the yellow, and the pink lady's-slippers (*Cypripedium*).

The culture of orchids began in England about 1820, but did not become general in the United States before 1865. There are many fine public and private collections of growing orchids, and almost fabulous prices have been paid for single rare specimens. Many epiphytal orchids may be planted in pots filled with loose fibrous peat; the roots of others are placed in baskets or are fastened to blocks of wood or cork, with a little moss around them to retain moisture, and are thus placed on shelves or are suspended from the roof of the hothouse. Ventilation and temperature must be carefully attended to, and the atmosphere must not be constantly very hot and humid, but seasons of rest must be given to the plants, since in their native climate they have generally a wet and a dry season. Most of the American species can be easily grown in shaded gardens. See Plates of MONOCOTYLEDONS and EPIPHYTES.

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ORCHIL. See ARCHIL.

ORCHOM'ENUS (Lat., from Gk. 'Ορχομενός, *Orchomenos*). 1. A famous ancient city of Bœotia, situated on a southerly spur of Mount Acontium, on the northwest shore of Lake Copaïs. It seems to have played a great rôle in legendary times as capital of the Minyæ and chief city of Bœotia. A relic of this early age is the beehive tomb, or Treasury of Minyas (q.v.), a work of the Mycenæan civilization and but little smaller than the Treasury of Atreus at Mycenæ. (See ARCHÆOLOGY, III, *Mycenæan Period*.) It was excavated by Schliemann (q.v.) in 1880 and 1886. After the Bœotian conquest Orchomenus was a member of the confederacy, and second only to Thebes. In the fourth century B.C. it appears as bitterly hostile to Theban supremacy and in close alliance with Sparta. In consequence, after the battle of Leuctra (371 B.C.) the Thebans destroyed the city and sold the inhabitants into slavery (368 B.C.); restored by the Phocians, it was again destroyed in 346 B.C. Rebuilt by Philip or Alexander of Macedon, it continued to exist in Roman times; here in 85 B.C. Sulla defeated an army of Mithridates. Orchomenus was chiefly noted for its worship of the Charites (q.v.) or Graces, here ancient and powerful goddesses of light and bringers of fruitfulness. Their festival, the Charitesia, was accompanied by musical and poetic contests, of which records are preserved in inscriptions containing the names of the victors. The remains of the ancient walls and the small castle which crowned the Acropolis are still well preserved and are fine examples of the best period of Greek fortification. Consult: K. O. Müller, *Orchomenos und die Minyer* (Breslau, 1844); Leake, *Travels in Northern Greece*, vol. iii (London, 1835); Schliemann, "Orchomenos" (Leipzig, 1881;

trans. in *Journal of Hellenic Studies*, vol. iii); Schuchhardt, *Schliemann's Excavations* (London, 1891); Chrestos Tsountas and J. I. Manatt, *The Mycenæan Age* (Boston, 1897; new ed. in progress); Frazer, *Pausanias*, vol. v (ib., 1898); K. Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909); H. R. Hall, *Ægean Archæology* (London, 1915). 2. Orchomenus was also the name of a town in northeastern Arcadia, represented in the legends as of much importance during the heroic age but of little importance in later times. Its situation on a lofty hill commanding the roads from Mantinea to the north made it a position of some strategical value during the time of the Macedonian wars and the Achæan League.

ORCIN, ôr'sĭn (from *orchil*, *archil*, from OF. *orchel*, *orcheil*, *orseil*, Fr. *orseille*, It. *orcella*, *oricello*, archil; of uncertain origin), $C_7H_8O_2 + H_2O$. A colorless substance contained in the lichens from which the commercial coloring matters archil and litmus (qq.v.) are made. It has a sweetish nauseating taste, but no odor, and is soluble in water, alcohol, and ether. In the hydrated state it melts at 58° C. (about 136° F.); in the anhydrous state at 108° C. (about 226° F.). Its chemical constitution is represented by the formula $C_6H_3(CH_3)(OH)_2$, showing it to be a dioxytoluene; the methyl and the two hydroxyl groups are symmetrically distributed in the molecule, and thus orcin may be considered as a homologue of resorcin. Besides being contained in the lichens ready formed, orcin is produced in considerable quantities from the orcellinic acid contained in the lichens when the latter are heated with lime. Orcin has also been prepared artificially. When exposed to the simultaneous action of ammonia and oxygen it is transformed into orcein (q.v.).

OR'CUS. The Latin name of Hades (q.v.).

ORCZY, ôr'chĭ, Baroness (Mrs. Montagu Barstow) (?   ). An English novelist, born at Tarnaörs, Hungary, daughter of Baron Felix Orczy. After her marriage she lived much in London, where she studied painting at the Heatherley School and exhibited at the Royal Academy and elsewhere. She began writing in 1900, her detective stories entitled *The Old Man in the Corner* appearing that year in the *Royal Magazine*. *The Scarlet Pimpernell* (1905), which probably represents her at her best as a novelist, was dramatized. Her fiction includes also: *A Son of the People* (1906); *The Tangled Skein* (1907); *Beau Brocade* (1908); *Petticoat Government* (1910); *A True Woman* (1911); *Fire in Stubble* (1912); *Eldorado* (1913); *Unto Cæsar* (1914); *Bride of the Plains* (1915).

ORD, Edward Otho Cresap (1818–83). An American soldier, born at Cumberland, Md. He graduated at West Point in 1839, was commissioned a second lieutenant in the Third Artillery and sent to Florida, where he took part in the Seminole War (1839–42). During the war with Mexico he performed garrison duty at Monterey, Cal. (1847–49), and in 1850 was promoted to be captain. During the following years he was engaged on frontier duty and saw much active service against the Indians. At the outbreak of the Civil War he was commissioned brigadier general of volunteers and defeated Gen. J. E. B. Stuart at Dranesville (Dec. 20, 1861). He was promoted to be major general of volunteers on May 2, 1862, and soon afterward sent to the West, where he commanded the left wing of Grant's army. For his services at the battle of Iuka (Sept. 19, 1862) he was brevetted colonel in the regular army. On July 21, 1864, he was appointed commander of the Eighteenth Army Corps and took part in the Richmond campaign, but was wounded at the capture of Fort Harrison (Sept. 29, 1864) and was on sick leave until December. For his gallantry on this occasion he was brevetted major general in the regular army (March 13, 1865), and after his recovery received command of the Department of Virginia. It was largely owing to his skill and energy that Lee's troops were finally headed off and compelled to surrender. He was commissioned brigadier general in the regular army in 1866, and soon afterward was mustered out of the volunteer service. He retired in 1880, and the next year by special act of Congress was commissioned major general.

OR'DEAL (AS. *ordēl*, *ordāl*, OHG. *urteili*, Ger. *Urteil*, decision, judgment, from AS. *ā-*, OHG. *ar-*, *ir-*, *ur-*, Ger. *er-*, out + AS. *dæl*, Goth. *dails*, *daila*, OHG. *teil*, Ger. *Teil*, part, connected with OChurch Slav. *dēlŭ*, part). A practice, which has prevailed among various widely separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgment of God, determined either by lot or by the success of certain experiments. Of its existence among the ancient Jews we have an instance in Numbers v, where a Hebrew woman, accused of adultery, is required to drink the bitter water as a test of innocence; a similar ordeal for incontinence is said to be in use among the natives of the Gold Coast of Africa. The practice of ordeals as existing among the Greeks is referred to in Sophocles' *Antigone*. Among the Hindus the ordeal has been practiced in nine different ways—by the balance, by fire, by water, by poison, by the cosha, or drinking water, in which images of the sun and other deities had been washed, by chewing rice, by hot oil, by red-hot iron, and by drawing two images out of a jar into which they have been thrown.

The Celts in Ireland, the Germans before their conversion, and the early Slavs made use of ordeals. After their conversion to Christianity they employed ordeals with the full sanction of the Church. In the early Middle Ages there was no trial in the modern sense of the word. The accused was required to prove his innocence by compurgation (q.v.), the wager of battle (q.v.), or an ordeal. In the wager of battle and the ordeal of the cross (see below) both plaintiff and defendant were put to the proof, but in all other ordeals and in compurgation the burden of proof rested upon the negative. Christian rites took the place of pagan ceremonies and God was called upon to show the truth. The forms most commonly employed were the ordeals of boiling water, of fire, of red-hot iron, of cold water, of the cross, of the corsned, and of the eucharist.

In the ordeal of boiling water the accused was obliged to insert his hand into a caldron of boiling water. Sometimes he had to take out a small object; in some cases he put in his hand only as far as the wrist; in the triple ordeal, as far as the elbow. After the trial the hand was sealed up for three days. Innocence or guilt was held to be proved by its condition when unsealed. In the ordeal of fire the original custom may have been that the accused placed his hand in the fire. Later two piles of wood were laid a short distance apart and then were set on fire. The accused walked between the two. In such cases it is probable that 15 days were allowed to the accused before his injuries were inspected. The genuineness of relics was often tested by this ordeal. The ordeal of red-hot iron was employed in two forms. In one case 6, 9, or 12 red-hot plowshares were placed on the ground, among which the accused walked blindfolded, and his innocence was shown by his avoidance of them; or he was compelled to step on each. In the second form the accused was compelled to carry a red-hot iron, usually for a distance of 9 feet. This ordeal was generally chosen by persons of rank. The ordeal of cold water rested upon the belief that the water when sanctified by religious rites would refuse to receive the guilty, while the innocent would sink. This method long remained in use for witches. In the ordeal of the cross both accuser and accused stood with uplifted hands before a cross and the one who kept his position longest won. This was prohibited by the Emperor Louis the Pious (814–840), but was frequently employed. The corsned was in use by the Anglo-Saxons and was carried out by giving the accused a piece of bread or cheese to swallow. If he was successful he was innocent. The ordeal of the eucharist was similar. In all of the forms the ordeal was administered only after special religious services.

Other kinds of ordeal were practiced under particular circumstances in different parts of Europe. In the ordeal of the bier a supposed murderer was required to touch the body of the murdered person, and was pronounced guilty if the blood flowed from his wounds.

Trial by ordeal at first carried with it the sanction of the Church as well as of the civil power, though the clergy in the course of time came to discountenance it. At the fourth Lateran Council in 1215 ecclesiastical ceremonies at ordeals were absolutely forbidden. Secular rulers followed the Pope's example in condemning the ordeal, and it was abandoned generally in the thirteenth century, although, as noted above, certain isolated usages long prevailed. Consult: Federico Patetta, *Le ordalie* (Turin, 1890); H. C. Lea, *Superstition and Force* (4th ed., Philadelphia, 1892); J. B. Thayer, *Preliminary Treatise on Evidence, etc.* (Boston, 1896); Richard Schröder, *Lehrbuch der deutschen Rechtsgeschichte* (4th ed., Leipzig, 1902); Heinrich Brunner, *Deutsche Rechtsgeschichte*, vol. i (2d ed., ib., 1906). See CORSNED.

ORDEAL NUT. See CALABAR BEAN.

OR'DER (Lat. *ordo*, row, series, orderly arrangement; connected with *oriri*, Gk. ὀρνύναι, *ornynai*, Skt. *ar*, to rise). A term used for a group of plants or animals in classification (q.v.).

ORDERICUS, VITALICUS. See VITALICUS ORDERICUS.

OR'DERLY. In the United States army an enlisted man, usually a private, assigned to a headquarters or to an officer for duty as a messenger, horse holder, or other personal service of an official character, such service including the care of the officer's horse and equipment in garrison or in the field. The orderly assigned to a general officer is usually a noncommissioned officer selected for the duty on account of military bearing, intelligence, and long service. The *Organization Tables, United States Army, 1914*, provide for a "mounted orderly section" of 1 sergeant and 19 privates for a regiment of infantry, 9 mounted orderlies for a regiment of cavalry or field artillery. The *Manual of Interior Guard Duty, United States Army, 1914*, provides for an orderly for the commanding officer in the following words: "When so directed by the commanding officer, the officer who inspects the guard at guard mounting will select from the members of the new guard an orderly for the commanding officer, and such number of other orderlies . . . as may be required." "For these positions the soldiers will be chosen who are most correct in the performance of duty and in military bearing, neatest in person and clothing, and whose arms and accoutrements are in the best condition." "Orderlies, while on duty as such, are subject only to the orders of the commanding officer and of the officers to whom they are ordered to report." Such orderlies are members of the guard and are relieved every 24 hours. The mounted orderlies authorized in the organization tables are permanent details. In addition to the two classes of orderlies above mentioned there are "room orderlies" and "stable orderlies," the former privates usually detailed daily by the company commander to police the barrack squad rooms and care for them in the absence of the other men; the latter privates detailed permanently as assistants to the stable sergeant in the care of the animals and stables. The room used by the company commander as an administrative office is often called the "orderly room." In the British army the orderly officer corresponds to the officer of the day in the United States army, the orderly sergeant to the first sergeant. The same usage prevailed in the early days of the American army and will be found in records of the American Revolution.

OR'DERS. Under the general title of orders are usually included monastic orders, orders of chivalry, and orders of merit. There is a certain connection between the first two, as the members of the earliest orders of knights took monastic vows. Again, there is a connection between the last two, as formerly persons distinguished by meritorious service were sometimes, even when not noble, admitted to an order of knights, and gradually membership in these orders became wholly an honorary distinction. Thus, in spite of the vast difference between an ancient monastic order and the present Legion of Honor, it is possible to see the evolutionary process which included under a common designation such widely different organizations.

Monastic orders were the earliest and became very important in the Middle Ages. Under the general term "monastic" may be included the various orders of canons, such as the Premonstratensians (q.v.), as well as of monks and nuns. Of these orders many are no longer in existence, but the total number of those extant and extinct is over 500; of these the majority adopted either the rule of St. Augustine, or the rule of St. Benedict, or the rule of St. Francis. For a fuller discussion of monastic orders, see CANON; MONASTICISM; and the names of the several orders.

Orders of knighthood are comparatively modern in their origin, although some have attempted to ascribe to certain ones great antiquity. In the ancient societies there was nothing of a similar nature. The equestrian order, or the order of decurions, in Rome was entirely different. (See EQUESTRIAN ORDER.) It was believed formerly that Clovis had founded in the fifth century an Order of the Holy Grail, but this is purely legendary. Equally mistaken is the attempt to attribute the beginnings of the orders of chivalry to Charles Martel, who is said to have established the Order of the Genette in 726. The romances of chivalry usually attributed the creation of knightly orders to Charles the Great or King Arthur; but the 12 peers of Charlemagne and the Knights of the Table Round are equally mythical. The mediæval orders, in reality, had their beginning in the Holy Land during the time of the Crusades. The Knights of the Hospital and the Knights of the Temple were the earliest orders and were alike in requiring their members to be of noble birth and also to take the three monastic vows of poverty, chastity, and obedience. (See ST. JOHN OF JERUSALEM, KNIGHTS OF; TEMPLARS.) These religious military orders became very renowned and gained enormous wealth. Their example led to the foundation of other similar orders for the protection of the Holy Land. Later some transferred their sphere of action to crusades against the heathen in the West or to service in the papal armies. As their members were bound by no national ties they were of great service to the Church in its wars. The destruction of the Templars and the temporal weakness of the popes in the fourteenth century led to a decline in the importance of these religious orders. Those which still exist, as the Hospitalers do under the name of the Knights of St. John of Jerusalem (q.v.), have entirely changed their activities.

On the other hand, the rise of strong monarchs in the period of the Renaissance led to the creation of royal and noble orders whose members were selected by the kings. By this means the rulers were enabled to confer honorary distinction upon their favorites and to bind closely to their own fortunes members of the nobility. Since the age of the Renaissance many orders have been created by monarchs to reward services or merit.

These orders may be classified as royal orders, noble or family orders, and orders of merit; but the last two are scarcely distinguishable in some respects. The royal orders, such as the Garter, the Golden Fleece, or the Black Eagle, are sometimes known as the Prime Orders of Christendom. Membership is usually reserved for persons of royal stock and those who are of the most eminent rank in the European kingdoms. Noble orders, such as Calatrava or Montesa, are few in number, and their members are usually selected from the higher nobility. Family orders, such as the Royal Victorian or the Hohenzollern, are composed of those who have in some way rendered especial service to the reigning family from which the order takes its name. Orders of merit, such as the Bath, Pour le Mérite (in Prussia), or the Legion of Honor, are intended to recompense especially meritorious service of any kind.

Of late years there has been an enormous increase in the number of orders which are purely honorary. The custom has spread from European countries to America, Asia, Africa, and the Pacific islands. Probably a majority of the civilized or semicivilized countries of the world now have one or more orders intended to confer distinction upon their own citizens, but also awarded at times to foreigners who are favorites of the sovereign, or have performed some especial service to the country, or are noted for their conspicuous scientific ability. The *Almanach de Gotha* enumerates more than 350 in the different countries of the world; but this list contains some agencies established for the recognition of merit which are not, properly speaking, orders. Thus, the Medal of Honor established by the United States in 1862 does not confer upon its possessor membership in an order. In fact, in the United States there are no real orders, with the possible exceptions of the Cincinnati and the Naval and Military Order of the Spanish American War. The patriotic societies and the many organizations which have taken the name of orders could not be included among orders as usually defined. (See PATRIOTIC SOCIETIES.) Neither is the Victoria Cross, awarded in Great Britain for conspicuous bravery, the insignia of an order. In comparatively recent times many orders, including the Royal Order of Victoria and Albert and the Imperial Order of the Crown of India, have been created especially for women.

The great orders usually have only one class; other orders very generally have three classes—Knights Grand Cross (K.G.C.), Knight Commanders (K.C.), and Companions (C.). Sometimes an order contains more classes, as the Royal Victorian, founded in 1896, which has five classes, designated respectively as G.C.V.O., K.C.V.O., C.V.O., and M.V.O. The last constitutes the fourth and fifth classes; although they are all entitled members, the insignia of those who belong to the fourth class are different from those of the fifth class. The Order of Merit, instituted by Edward VII in 1902, contains but one class. The insignia naturally vary greatly in the different orders, but almost all consist of either stars, crosses, or ribbons. The Knights Grand Cross usually have a cross or star attached to a ribbon worn over the shoulder. The Knight Commanders have a star or other badge, but the ribbon is worn about the neck. The Companions have a cross or badge, but no star. These rules do not hold good for all orders, but they represent ordinary usage in European countries.

Membership in orders is highly prized, but in some countries, especially the United States and France, restrictions are placed upon the acceptance by citizens of such distinctions. By the Constitution of the United States no one holding an office of profit or trust under the government is allowed, without the consent of Congress, to accept any decoration from a monarch or foreign state. In France, since 1815, although the law has been repeatedly modified, no citizen can be a member of a foreign order unless he receives the authorization of the government.

The following is a list of the principal orders of the world, only those which were in existence in 1915 being included. Those marked with the asterisk are described in their alphabetical order in this ENCYCLOPÆDIA.

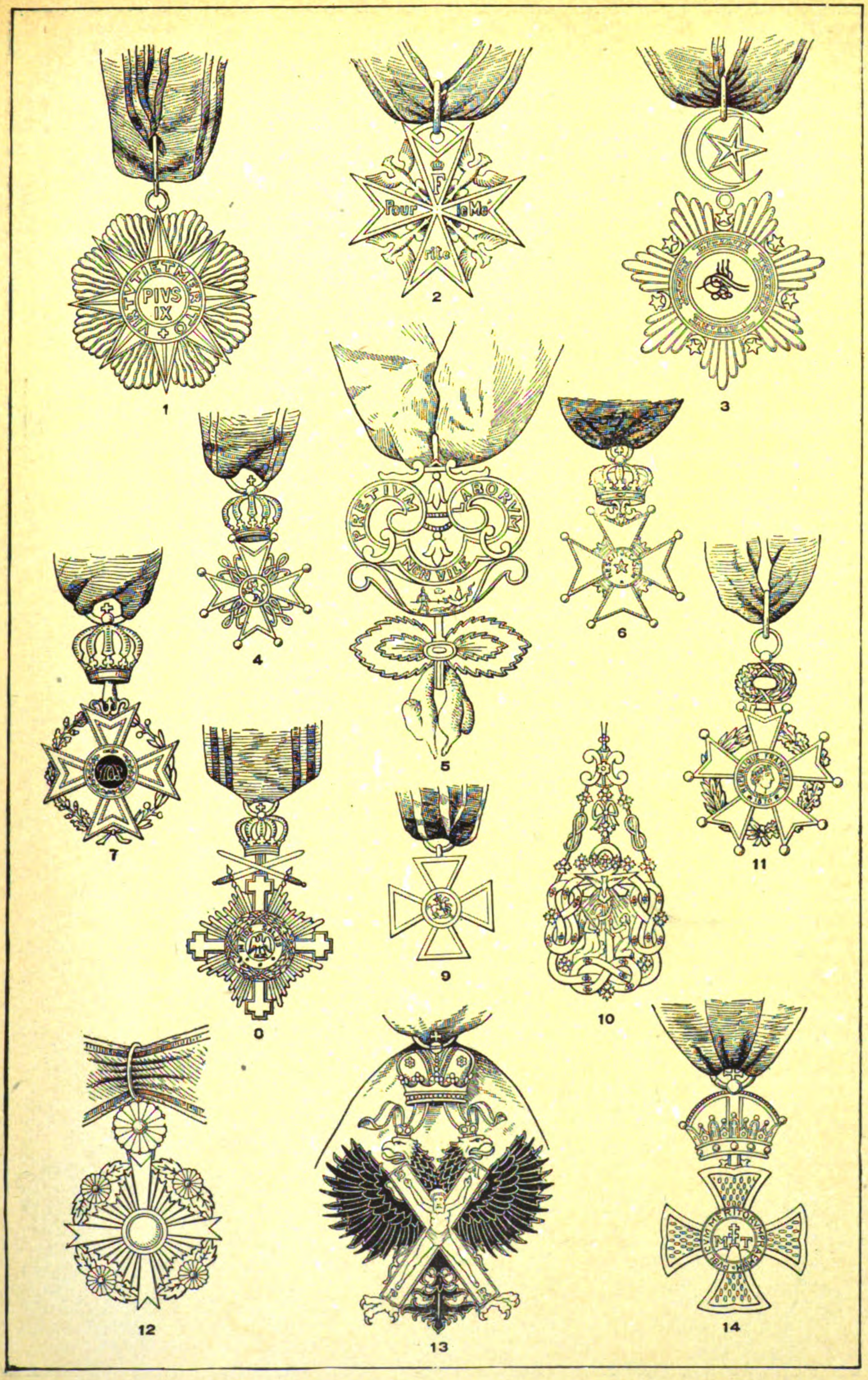
ABYSSINIA

**Seal of Solomon.*

ANHALT

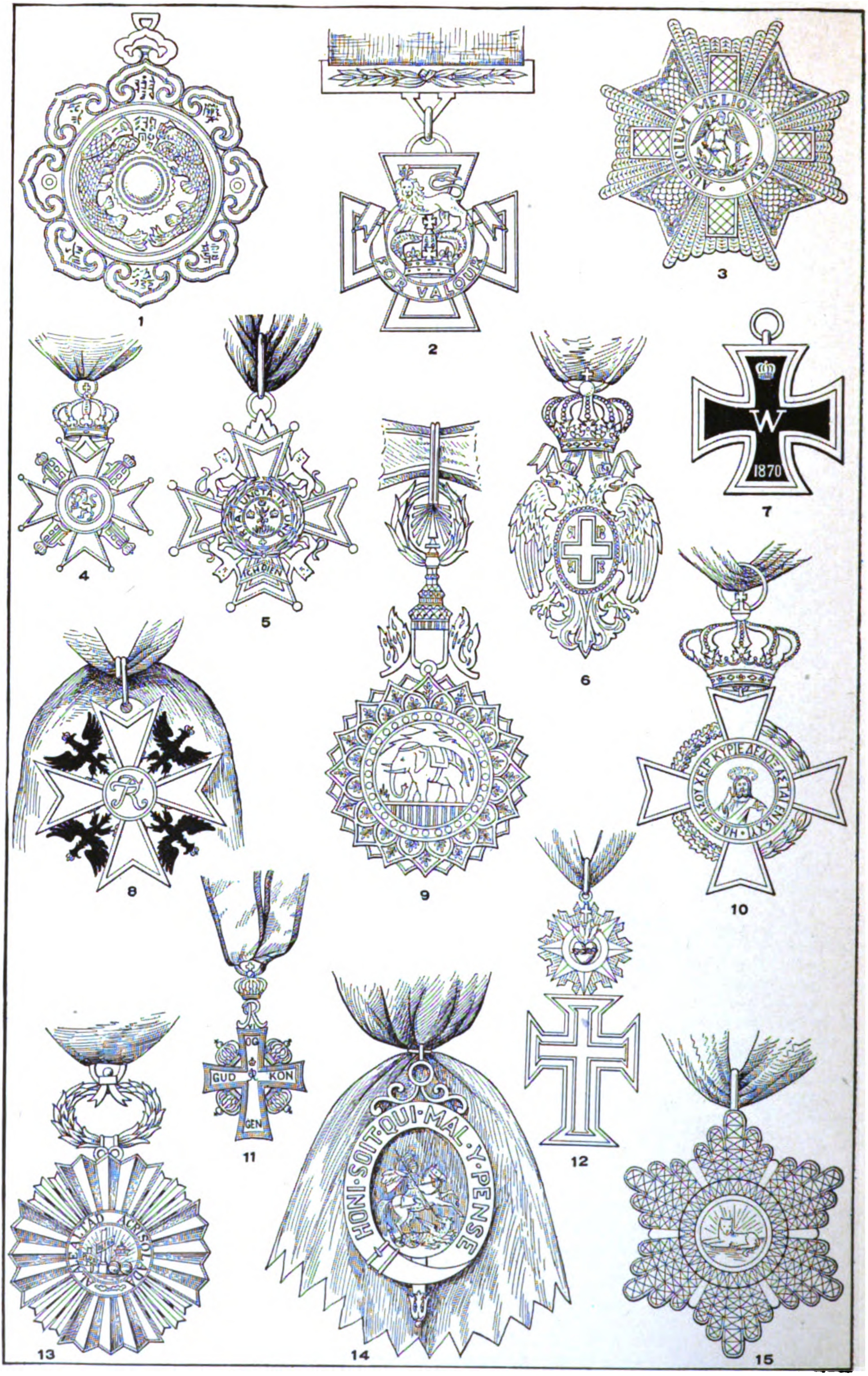
Albert the Bear.—An order with five classes, founded by the reigning dukes in 1836. The

ORDERS I.



1. PIUS IX., PAPAL
2. POUR LE MÉRITE, PRUSSIA
3. MEDJIDIE, TURKEY
4. LION, NETHERLANDS
5. GOLDEN FLEECE, AUSTRIA
6. NORTH STAR, SWEDEN
7. LEOPOLD I., BELGIUM
8. STAR OF RUMANIA
9. ST. GEORGE, RUSSIA
10. ANNUNCIATION, ITALY.
11. LEGION OF HONOR, FRANCE
12. CHRYSANTHEMUM, JAPAN
13. ST. ANDREW, RUSSIA
14. ST. STEPHEN, HUNGARY

ORDERS II.



1. DOUBLE DRAGON, CHINA
2. VICTORIA CROSS, GREAT BRITAIN
3. ST. MICHAEL AND ST. GEORGE, GREAT BRITAIN
4. OLAF, NORWAY
5. BATH, GREAT BRITAIN
6. WHITE EAGLE, SERVIA
7. IRON CROSS, PRUSSIA
8. BLACK EAGLE, PRUSSIA
9. WHITE ELEPHANT, SIAM
10. REDEEMER, GREECE
11. DANEBROG, DENMARK
12. CHRIST, PORTUGAL
13. ISABELLA THE CATHOLIC, SPAIN
14. GARTER, GREAT BRITAIN
15. SUN AND LION, PERSIA

oval decoration shows a crowned bear mounting a wall, with the motto, _Fuerchte Gott und befolge seine Befehle._

Order of Merit for Science and Art.—Founded by Duke Frederick in 1873 and reorganized in 1905 and 1912.

AUSTRIA-HUNGARY

*_Golden Fleece._ See also Plate of ORDERS.

*_Maria Theresia._

*_St. Stephen._ See also Plate of ORDERS.

*_Leopold._

Iron Crown.—A civil and military order, founded by Napoleon in 1805; extinct in 1814; reëstablished by Francis I in 1816. The decoration is the iron crown of Lombardy under the double-headed Austrian eagle bearing upon its breast a shield of blue enamel with the initial F.

Francis Joseph.—A civil order of merit, founded in 1849 by the Emperor Francis Joseph. The decoration is a red cross with the double-headed eagle, the initials F. J., and the motto _Viribus Unitis._

Elisabeth-Theresia.—A military order, founded in 1750 by the Empress Elizabeth Christina and reorganized by Maria Theresa in 1771. The order was instituted for 20 generals and colonels, and was conferred after 30 years' service in the Imperial army. It carries with it a yearly pension. The decoration is an eight-pointed star bearing the initials E. C. and M. T. in an oval, with the inscription _Maria Theresia parentis gratiam perennem voluit._

Starry Cross.—An order for women of the old nobility, founded in 1668 by the Empress Eleonore to commemorate the recovery of a relic which had been lost.

Military Order of Merit.—An order founded by Emperor Francis Joseph in 1849.

Order of Merit for Science and Art.—An order founded by Emperor Francis Joseph in 1887.

BADEN

Fidelity.—An order with one class, founded in 1715 by the Margrave Charles William and conferred on foreign princes and state officials of high rank. The decoration is a cross of red enamel with eight points, the arms connected by intertwined C's, which appear also on the central white field above three rocks, with the legend _Fidelitas._

Charles Frederick.—A military order of merit, with three classes, founded in 1807 by Charles Frederick, Grand Duke of Baden. The decoration consists of an eight-pointed cross of white enamel within a laurel wreath. The medallion bears the initials of the founder and the legend _Für Badens Ehre._

Lion of Zähringen.—An order of merit, established by Grand Duke Charles Louis in 1812.

Berthold I.—Established 1896 and detached from the Lion of Zähringen, of which it had formerly been the highest class.

BAVARIA

*_St. Hubert._

*_St. George._

*_St. Elizabeth._

Maximilian Joseph.—A military order founded in 1797 and renewed in 1806.

Bavarian Crown.—A civil order of merit, founded in 1808 by King Maximilian I. It is given to state officials of all classes and confers noble rank on the recipient. Foreigners who have rendered service to Bavaria are also eligible for the order. The decoration is a white cross with eight arms bearing the inscription _Virtus et honos._

*_St. Michael._

*_Maximilian._

*_Louis._

Theresa.—Order for women, founded in 1827.

Cross of Merit.—A distinction for voluntary services to the army during the years 1870 and 1871, founded in 1871 by King Louis II. Open to women.

Military Order of Merit.—An order founded in 1866 by King Louis II.

BELGIUM

*_Leopold._ See also Plate of ORDERS.

African Star.—An order founded in 1888 by King Leopold II as a distinction for services to the Congo State and to African civilization in general. The decoration, a five-pointed star with laurel wreath, bears the legend _Travail et progrès._

Iron Cross.—A civil order, founded in 1867 by Leopold II for civic virtue and for bravery and self-sacrifice.

BRUNSWICK

Henry the Lion.—A civil and military order of merit, founded in 1834 by Duke William. The decoration is an eight-pointed cross of blue enamel, with red centre, bearing a pillar and a leaping horse in white. The arms of the cross bear peacock feathers and are separated by a W surmounted by a lion. The cross is surmounted by a lion and a crown which suspends it from a red ribbon. The legend is _Immota fides._

BULGARIA

Alexander.—1. A military order of merit, founded by Prince Alexander in 1881. The decoration, an eight-pointed white cross, with crossed swords between the arms, bears the Bulgarian lion on a red field, with the inscription _Za Chrabrost_ (For courage) and the monogram of the Prince. 2. An order of civil merit, founded by Prince Alexander in 1879. The decoration is an eight-pointed white cross bearing in a red field the legends _Saint Alexander_ and _God with us._

Order of Merit.—An order founded in 1891 by Prince Ferdinand.

St. Cyril and St. Methodius.—An order founded in 1909 to commemorate the declaration of independence.

CHINA

*_Double Dragon._ See also Plate of ORDERS.

Order of Merit.—A civil order, with three classes.

CONGO FREE STATE

*_African Star._ See above under _Belgium._

DENMARK

*_Elephant._

*_Danebrog._ See also Plate of ORDERS.

FRANCE

*_Legion of Honor._ This is the only existing order in France. See also Plate of ORDERS.

GREAT BRITAIN

*_Garter._ See also Plate of ORDERS.

*_Thistle._

*_Bath._ See also Plate of ORDERS.

*_St. Patrick._

*_St. Michael and St. George._ See also Plate of ORDERS.

Victoria and Albert.—An order for women, founded in 1862.

St. Catharine.

**Distinguished Service Order.*

**Victoria Cross.* See also Plate of ORDERS.

**Red Cross.*

**Star of India.*

Imperial Order of the Indian Empire.—An order founded by Queen Victoria after assuming the Imperial title in 1877.

Imperial Order of the Crown of India.—An order for women, including natives of India, founded by Queen Victoria in 1877.

Royal Victorian.—Founded in 1896.

Order of Merit. See MERIT, ORDER OF.

GREECE

**Redeemer.* See also Plate of ORDERS.

HESSE

Louis.

**Philip the Magnanimous.*

**Lion.*

Military Service Cross.—A decoration founded in 1870 by Grand Duke Louis III for men and women. The cross bears the inscription *For care of soldiers, 1870.*

INDIA

See above under *Great Britain.*

ITALY

Annunziata. See ANNUNCIADE; also Plate of ORDERS.

**St. Maurice and St. Lazarus.* See MAURITIUS AND LAZARUS.

Civil Order of Savoy.—An order with one class, founded by King Charles Albert of Sardinia in 1831. It was included among the Italian orders in 1860.

Military Order of Savoy.—An order with five classes, founded by King Victor Emmanuel I of Sardinia in 1815.

Crown of Italy.—An order commemorating the union of Italy, founded by Victor Emmanuel II in 1868. The decoration is a white cross, with the iron crown of Lombardy, the black eagle, and the cross of Savoy.

JAPAN

**Rising Sun.*

Chrysanthemum.—An Imperial order conferred only on monarchs and the highest state officials, founded in 1876 by the Mikado. The decoration is a star with 32 white rays with four chrysanthemums between green leaves. The obverse of one of the flowers bears the inscription *Exalted deeds and honorable actions.* See Plate of ORDERS.

Sanctified Treasure.—An order with eight classes, founded by the Mikado Mutsuhito in 1888.

LIBERIA

African Liberation.—An order with three classes, established by the Legislative Assembly in 1879.

LUXEMBURG

**Oak Crown.*

Golden Lion.—An order founded in 1858 by Duke Adolph of Nassau and King William III of the Netherlands. It consisted originally of only one class, but later was divided into four, and now exists only as an order of Luxemburg with one class. The white cross, the arms of which are separated by golden N's, has a central blue medallion with the lion; on the reverse the motto *Je maintiendrai.* The ribbon is orange with blue stripes.

Adolph of Nassau.—A military and civil order with five classes and two crosses, founded by Duke Adolph in 1858.

MECKLENBURG

Griffin.—An order of merit, instituted in 1884 by Grand Duke Frederick Francis III of Mecklenburg-Schwerin. The insignia are an eight-pointed red cross with a golden medallion bearing a griffin, and an eight-pointed silver star with the legend *Altior adversis.*

Wendish Crown.

Military Order of Merit.—An order with two classes, founded in 1848 by Grand Duke Frederick Francis II of Mecklenburg-Schwerin.

Military Order of Merit.—An order founded in 1871 by Grand Duke Frederick William of Mecklenburg-Strelitz.

MONACO

**St. Charles.*

MONTENEGRO

St. Peter.—A house order with one class, founded by Prince Danilo I in 1852.

Danilo.—A military and civil order with four classes, founded in 1855 by Prince Danilo I. The cross bears the initials of the Prince, the inscriptions *Prince of the Black Mountains, For the independence of the Black Mountains,* and the date, 1852–53. The grand cross is conferred only on princes.

NETHERLANDS

**William.*

**Netherland Lion.* See also Plate of ORDERS.

**Orange-Nassau.*

NORWAY

**St. Olaf.*

Norwegian Lion.—An order of merit, with one class and 12 members, founded by Oscar II of Norway and Sweden, Jan. 21, 1904.

OLDENBURG

Duke Peter Frederick Louis.—A civil and military order, founded by Grand Duke Frederick Augustus in 1838. The decoration, a white cross, has a blue medallion with the monogram P. F. L., surrounded by a red band with the inscription *Ein Gott, ein Recht, eine Wahrheit.*

PAPAL

Holy Sepulchre. See HOLY SEPULCHRE, KNIGHTS OF THE.

**Golden Spur.*

Christ. See CHRIST, PAPAL ORDER OF.

St. Gregory the Great.—Founded in 1831 by Pope Gregory XVI.

**Pius IX.* See also Plate of ORDERS.

**Pro Ecclesia et Pontifice.*

PERSIA

**Sun and Lion.* See also Plate of ORDERS.

PRUSSIA

Black Eagle. See EAGLE, BLACK; also Plate of ORDERS.

Red Eagle. See EAGLE, RED.

**Pour le Mérite.* See also Plate of ORDERS.

Prussian Crown.—An order with four classes, founded in 1861 by King William I in commemoration of his coronation. The cross bears the royal crown with the inscription *Gott mit uns.*

Hohenzollern.—A civil and military order of merit of the princely house of Hohenzollern, founded in 1841 by the princes Frederick William Constantine and Charles Anthony. It was under Prussian protection, and when Hohenzollern was united with Prussia was made in 1851 a royal order with two branches. The Prussian order has four classes. Its decoration consists of a black and white cross and an eagle, each with the device *Vom Fels zum Meer*, and the date, Jan. 13, 1851. The princely order has four classes, with a golden eight-pointed cross enameled in white and black as a decoration, with the motto *Für Treue und Verdienst.*

**Iron Cross.* See also Plate of ORDERS.

**William.*

Louise.—Order for women, founded in 1814.

Cross of Merit.—A distinction conferred on women for services during the War of 1870–71, founded by Emperor William I in 1871.

Cross of Merit.—Founded by the Emperor in 1912.

RUMANIA

Star of Rumania. See Plate of ORDERS.

Crown.—An order with five classes, founded in 1881 by King Charles I. It commemorates the elevation of Rumania to a kingdom.

Carol I.—Founded in 1906 by King Charles I.

RUSSIA

St. Andrew. See Plate of ORDERS.

White Eagle.

**St. Catharine.*

**St. Alexander Nevski.*

**St. Ann.*

**St. Stanislas.*

**St. George.* See also Plate of ORDERS.

**St. Vladimir.*

**Red Cross.*

SAXONY

**Rue Crown.*

**St. Henry.*

Order of Merit.—A royal order, founded by Frederick Augustus I in 1815, with five classes.

Albert.—A royal order with four classes, founded by Frederick Augustus II in 1850. It is conferred for services to the state, for civil merit, science, and art. The white cross bears a portrait of Duke Albert the Bold of Saxony (1443–1500), founder of the Albertine line, surrounded by the inscription *Albertus animosus* and the Saxon arms with the date 1850.

**Sidonia.*

SAXON DUCHIES

**White Falcon.*

Ernestine House.—An order founded in 1690 and renewed in 1833 by the dukes of Saxe-Meiningen-Hildeburghausen, Saxe-Coburg-Gotha, and Saxe-Altenburg. The order has five classes, and a silver cross of merit and gold and silver medals are connected with it. The grand cross of the order confers hereditary nobility. The decoration is an eight-pointed white cross edged with gold, having golden lines between the arms. Within a central wreath is the bust of Ernest the Pious with the inscription *Fideliter et constanter.*

SAVOY

See under *Italy.*

SERVIA

**White Eagle.* See also Plate of ORDERS.

**St. Sava.*

Crown.—Founded in 1911 to replace the Order of the Takovo.

SIAM

**White Elephant.* See also Plate of ORDERS.

**Sacred Order.*

Crown.—An order of merit founded in 1869. The decoration is a blue medallion with a circle of pearls, edged with red and green lotus blossoms.

Chakri.—An order with two classes, founded in 1884.

Chulakonklao.—A family order with three classes, founded in 1873 by the King of Siam on his accession to the throne. It was intended to be conferred on members of the families of previous kings and to form the basis of a high nobility.

SPAIN

**Golden Fleece.*

**Alcántara.*

**Calatrava.*

**St. James of the Sword.*

**Montesa.*

Charles III.—A civil and military order, founded by Charles III in 1771 in honor of the Immaculate Conception. The order was dissolved by Joseph Bonaparte and was restored in 1814. It was conferred on nobles for distinguished services. The cross is of blue enamel with a white border, and the arms are separated by lilies. The central oval bears an image of the Virgin, and on both sides is the inscription *Virtuti et merito.* The cross is suspended from a laurel wreath.

**Maria Louisa.*

**St. Ferdinand.*

**St. Hermengild.*

**Isabella the Catholic.* See also Plate of ORDERS.

Military Order of Merit.—An order with four classes, founded by Queen Isabella II in 1864.

Naval Order of Merit.—An order with three classes, founded by Queen Isabella II in 1866.

Maria Christina.—A military order with three classes, founded in 1890 by the Queen Regent Maria Christina.

SWEDEN

**Seraphim.*

**Sword.*

**North Star.* See also Plate of ORDERS.

**Vasa.*

Charles XIII.—An order with one class, founded in 1811 by King Charles XIII. It is designed for Freemasons of the highest rank and has 30 members. The order provides for the needy children of deceased members.

TUNIS

**Nishan el Aaman.*

Hussein.—An order founded by Ahmed Bey and worn in Tunis only by the Bey and princes and two of the highest state officials. It may be conferred also on foreign reigning princes and on princes of the blood.

**Nishan el Iftikhar.*

TURKEY

**Crescent.*

**Nishan el Iftikhar.*

**Medjidie.* See also Plate of ORDERS.

**Osmanie.*

**Nishan i Shefkat.*

**Nishan i Imtiaz.*

VENEZUELA

Bust of Bolivar.—An order commemorating Bolivar's services. It was founded at Carácas in 1854 by President Monagas.

WÜRTTEMBERG

Crown.—A civil and military order of merit, founded by King William I in 1818. The decoration is an eight-pointed cross with lions in the angles, bearing a medallion with the monogram of King Frederick and the motto *Furchtlos und treu.*

Military Order of Merit.—An order with three classes, founded in 1806 by Duke Charles Eugene.

Frederick.—A civil and military order of merit, founded in 1830 by King William I. It had originally one class and conferred nobility. It has now five classes. The cross is of white enamel edged with gold and with golden rays between the arms. The medallion bears a relief bust of King Frederick surrounded by a blue band with the inscription *Friedrich König von Württemberg.* The reverse bears the motto *Gott und mein Recht.*

Olga.

ZANZIBAR

**Radiant Star.*

Bibliography. J. B. Burke, *Book of Orders of Knighthood and Decorations of Honour of All Nations* (London, 1858); J. H. Lawrence-Archer, *Orders of Chivalry* (ib., 1887); Max Gritzner, *Handbuch der Ritter- und Verdienstorden aller Kulturstaaten der Welt innerhalb des neunzehnten Jahrhunderts* (Leipzig, 1893); J. H. Gore (comp.), *American Members of Foreign Orders* (Washington, 1910); *Almanach de Gotha* (Gotha, annually). See also the bibliographies under the separate orders.

ORDERS, Holy. The distinction of rank or office which differentiates the clergy of various Christian bodies from the laity; also the rite by which this office is conferred, which is one of the sacraments of the Roman Catholic and Eastern churches. As to the nature of the powers conferred by ordination an acute controversy has raged for centuries. The principal divergent views will be found partly under Bishop, especially as to distinctions of polity arising from them; but some further details remain to be given here.

The central point of the Roman Catholic and Eastern doctrine is the belief in the continuous existence of a real priesthood in the fullest sense of the word, of a body whose chief function is the offering of sacrifice. (See Sacrifice; Priest; Mass.) While there is a sense in which the priesthood of all the faithful may be asserted, it is yet contended that in its definite sense and in the fullness of its powers priesthood is conferred only by the laying on of a bishop's hands. (See Apostolic Succession.) As a matter of hierarchical gradation the Council of Trent asserts that the divinely instituted hierarchy consists of bishops, presbyters, and ministers. It follows, however, from what has been said that from another point of view the episcopate and the priesthood are not two separate orders, but the episcopate is simply the fullness of the priesthood, the power of ordination and confirmation being reserved to it. The orders are commonly held to be seven: those of priest, deacon, and subdeacon (major or holy orders), acolyte, reader, exorcist, and ostiarius or doorkeeper (minor orders). The latter as distinct gradations are admitted to be of ecclesiastical institution, and the Eastern churches practically include them all in the single office of anagnostes or reader. The Council of Trent affirmed major and minor orders, but did not give their number. As to the outward and visible sign which constitutes the "matter" of the sacrament there has been considerable difference of opinion among theologians, some making it the "tradition of the instruments" (the delivery of the chalice and paten to the candidate), while the majority in modern times hold it to be the laying on of hands; practically both are considered necessary. The sacrament is believed to confer an indelible stamp or "character," so that a man once a priest is always a priest, and ordination can never be repeated. See Deposition.

The Church of England, followed by her daughter churches, declares that "from the Apostles' times there have been three orders of ministers in Christ's Church, bishops, priests, and deacons," and requires them to be made by the laying on of the bishop's hands. For various technical reasons, however, the Roman Catholic church (while not questioning the orders of the Easterns, whom it regards as schismatics) has never in practice admitted the validity of Anglican ordinations; and an exhaustive discussion of the matter in 1896 was followed by a definite papal decision against them. Much difference of opinion has prevailed in the Anglican communion about the powers conferred, some holding that it confers grace and power, others that it is only a consecration to an office. In practice the indelibility of holy orders is recognized in the Anglican communion also, though in England a clergyman may legally renounce his orders and be considered a layman before the law, thus becoming capable of sitting in the House of Commons.

The nonepiscopal churches recognize but one order of the ministry, the presbyterate, as having Scriptural sanction. They assert that bishop and elder in the primitive churches were identical in function and authority. There is in many cases in their polities no clear distinction between order and office. The Baptist and Congregational churches declare that there are but two Scriptural officers of a Christian church, pastor and deacon, and that these are merely members set apart by their brethren for certain functions. In the polities of the Presbyterian and Reformed churches the perpetual officers of the church are declared to be bishops or pastors, ruling elders, and deacons. The Methodist church in America, while it uses the title bishop, does not differ substantially from the other bodies in this class as to its view of the nature of the ministry.

Ever since the Christian Church received the recognition of the political power, and more especially since the development of ecclesiastical establishments, the possession of holy orders has impressed a peculiar civil character upon the individual. For many centuries in all the European states the possession of orders, even the minor ones, caused a greater or less exemption from the jurisdiction of the civil courts. (See Benefit of Clergy.) By the common law as it has developed in the United States ministerial orders are regarded as voluntary relations which may be terminated at any time by the possessor and as not containing any contractual element. Along with certain benefits there have been certain civil disabilities attached to holy orders. In England and in the State of Maryland a minister of the gospel is not eligible for the Legislature. Exemption from jury duty and from service in the militia still generally attach to the possession of ministerial orders.

Bibliography. E. Hatch, *Organization of the Early Christian Church* (London, 1881); J. Wordsworth, *Ministry of Grace* (ib., 1901); T. M. Lindsay, *Church and Ministry in Early Centuries* (New York, 1903); Harnack, *Sources of the Apostolic Canons* (ib., 1895); L. M. O. Duchesne, *Christian Worship* (2d ed., ib., 1905); Charles Gore, *Orders and Unity* (ib., 1910).

ORDERS IN COUNCIL. An English legal term denoting orders issued by the sovereign with the advice of the Privy Council. The Privy Council of Great Britain has no power to legislate except so far as authorized to do so by Parliament; but in periods of emergency it has nevertheless occasionally issued and enforced orders of a legislative kind, those who were concerned in passing, promulgating, or enforcing the orders trusting to parliamentary protection and taking on themselves the personal responsibility of the proceedings. In such cases a subsequent act of indemnity has relieved from liability those who advised the order or acted under it, and has given compensation to all who suffered by its enforcement. The most famous orders in council were those issued in retaliation for Napoleon's Berlin and Milan decrees and those issued during the European War which began in 1914 declaring the North Sea a war zone and food an absolute contraband of war. See Continental System; War in Europe.

ORDERS OF ARCHITECTURE. The word "orders" is used in architecture in two senses: (1) to designate successive repetitions of a feature—as an arch, a mullion member, or a nook shaft—in different planes. Thus, in the stepped arches of mediæval architecture each arch or step is an order. (2) The word is far more often employed to designate an established type and combination of parts in columnar design, especially of column (q.v.) and entablature (q.v.) in classic and neoclassic architecture. In Egyptian and Persian architecture an unvarying type of entablature was used with columns of varied forms; in Greek and Roman architecture, in which the variety of types of column was small, each was associated with a particular type of entablature, and each of these combinations was called an order (*ordo*) by Vitruvius (q.v.), who wrote on architecture in the time of Augustus. The neoclassic writers of the Renaissance in Italy adopted the term and elaborated the Vitruvian rules into minute specifications for the design of each order; and from these Italian rules, which differed with each writer (Vignola, Palladio, Serlio, Scamozzi, etc.) and which were purely individual and theoretical canons, has arisen the very mistaken impression that the ancients, and especially the Romans, designed their columnar architecture by a mechanical application of hard and fast formulæ. This notion, constantly urged by many critics, is not borne out by the evidence of the monuments. These show a remarkable variety of detail and proportion, subject only to a certain uniformity of practice in the main features and proportions of each order.

The two Greek orders, the Doric and Ionic, were originally the distinguishing features of two different national styles, the first being presumably of European origin (though this is wholly conjectural) and the second undoubtedly of Asiatic origin. In the earliest Hellenic ruins the Doric order is seen complete in all its parts. For two centuries its development consisted solely of refinements of its proportions and details. (See Greek Art.) It consists (see Plate) of a massive shaft, standing without an intervening base, on the top step of the stylobate (q.v.) and bearing a simple capital of a round echinus and plain square abacus. The shaft is adorned with 16 to 20 shallow channels meeting in sharp edges or arrises; it tapers slightly, by a subtle curve (*entasis*) to the capital, and the entire column has a height of from four and a half to seven times the lower diameter. The entablature, like all the classic entablatures, consists of an architrave, frieze, and cornice. The Doric epistyle (architrave) is plain; a narrow fillet (tænia) separates it from the frieze, which is divided into square panels (metopes) by vertically channeled triglyphs. The cornice consists of a bed mold or band, a corona on whose under surface are mutules, with 18 guttæ each, and above it a cymatium on the raking cornices of the pediment, and a row of antefixæ along the side cornices. The Ionic order is more slender and ornate; the column, 8 to 10 diameters high, stands on a circular molded base, is adorned with 24 narrow flutings, and carries a peculiar capital with large spiral volutes connected by a band above a circular echinus carved with eggs-and-darts. The Ionic columns of the Erechtheum (q.v.) alone among Greek examples have a decorated necking and neck molding (see Neck, Neck Molding) below the capital. The epistyle is in two or more bands; the tænia is molded; the cornice is sometimes (in Asia especially) enriched with dentils, but has no mutules, and is crowned with a high cymatium, often enriched by carving.

A third Greek order, the Corinthian, is named by Vitruvius and most modern writers, but it was really a late and more highly enriched variant of the Ionic, from which it differed chiefly in its capital. This varies greatly in Greek buildings; its most highly developed form shows an inverted bell-shaped core, surrounded by two rows of acanthus leaves and four or eight pairs of small volutes supporting the corners and centres of a four-square abacus with concave sides. The entablature and base were of the Ionic type.

The Roman orders are four, according to Vitruvius—the Tuscan, Doric, Ionic, and Corinthian. To these the Renaissance writers added a fifth, the Composite, which was really a variant of the Corinthian. The Romans are said to have derived their orders from the Greeks, and this is true in part, but the common designation of the Tuscan as a simplified Doric is probably erroneous. The Tuscan was the national Etruscan form of column with an entablature of wood and terra cotta, before the conquest of the Greek cities and the copying of Greek art began. It was probably derived by the Etruscans from the same prehistoric source as the Greek Doric. The Roman Doric column was a variant or elaboration of the Tuscan, and wholly unlike the Greek; the entablature, with its triglyph and mutules, may have been derived from the Greek Doric directly, or independently developed by the Etruscans along with the Tuscan column.

The Ionic is clearly a Roman adaptation of the Greek Ionic, with smaller volutes and a narrower connecting band, straight and not convex downward like the Greek. Except in one or two instances it has no necking. The Roman Tuscan and Doric columns always have a neck molding and necking. The Corinthian order, which the Romans received from the Greeks as a variant of the Ionic, they developed into a complete order by giving it a special base and creating for it a new cornice by one of the most brilliant of architectural inventions, the modillion (q.v.) or cornice bracket. This transformed the denticulated Ionic cornice into a new cornice type of unexampled splendor, upon which nearly two thousand years of architectural effort have failed to devise any notable improvement. The Composite order differs from the Corinthian in its less happy treatment of the upper part of the capital and in slight variations in the cornice.

The Roman orders as a whole differ from the Greek in being more ornate and generally more slender. They lack somewhat of the refinement of the Greek profiles and details, but less so than is commonly asserted. The rules for their proportioning given by Vitruvius were only approximately observed by the architects either of his or of later times, and the various examples of each order vary among themselves quite as widely as the Greek. The Tuscan, Doric, and Ionic were only rarely used, there being hardly more than a half dozen known examples of each in monumental Roman architecture, except in theatres and amphitheatres, where two or three orders were superposed. (See SUPERPOSITION.) The Corinthian was the typical and national Roman order, used in temple porticoes and on triumphal arches, only occasionally in its variant form, the Composite. The architecture of Pompeii, especially that of the houses, shows an extraordinary variety in the treatment of all the orders, which rarely conform in any degree to the more monumental types of Roman architecture. The Roman combination of the column with the arch in such edifices as the Colosseum and in the triumphal arches, is sometimes called the arcaded order. The Romans further varied the design of their orders by the use of pedestals and the substitution, in certain designs, of pilasters (q.v.) for columns.

The Renaissance architects, seeking to revive the glories of ancient architecture, studied the Roman ruins with increasing care and regarded Vitruvius almost as an inspired guide. They elaborated his rules and applied their versions of the Roman orders to the architecture of their time with great ingenuity and success, and modern architects have continued and extended these applications. In the eighteenth and early nineteenth centuries many efforts were made to formulate orders for other than the classic styles, even for Gothic, Turkish, and Chinese architecture. In 1564 Philibert de l'Orme (q.v.) designed for the Tuileries his French order, really an enriched banded Doric or Ionic column (see Plate under COLUMN, Fig. 16); and the name Persian order was applied by Vitruvius to a colonnade of draped male statues in place of columns, supposed to have been erected at Sparta after the defeat of the Persians at Platæa. For illustrations of Greek and Roman orders, see accompanying Plate. Consult the works of Vitruvius, Vignola, Palladio, etc.; also De l'Orme, *Premier tome de l'architecture* (Paris, 1567); Charles Chipiez, *Histoire critique des origines et de la formation des ordres grecs* (Paris, 1876); Esquié, *Traité élémentaire d'architecture, comprenant les cinq ordres de Vignole* (Paris, 1900); Ware, *The American Vignola* (Scranton, 1912); Sir W. Chambers, *Civil Architecture* (2d ed., London, 1768).

OR′DINAL (Lat. *ordinalis*, denoting order, from *ordo*, series, row, orderly arrangement). A book containing the forms to be used in "making, ordaining, and consecrating bishops, priests, and deacons according to the order of the Church of England." The original form was prepared by order of the crown by a commission appointed in the third year of Edward VI (1550), and received the approval of Parliament. It was slightly amended in the year 1552 and again in 1662 on the recommendation of convocations. Although technically a separate book, the English Ordinal has since 1552 been bound up with the Book of Common Prayer. In their general structure the offices are similar to those found in the ancient liturgies, although much more simple. The series of questions addressed to the candidates is, however, a feature peculiar to it. The American form of the Ordinal dates from 1792. Consult Proctor and Frere, *A New History of the Book of Common Prayer* (London, 1905).

OR′DINANCE (ML. *ordinantia*, decree, from Lat. *ordinare*, to order, from *ordo*, row, series, orderly arrangement). In its broadest sense, any law or statute enacted or promulgated by governmental authority; more commonly laws or regulations passed by the governing bodies of municipalities. The term was formerly employed in England to describe a law or regulation which needed the assent of only one of the three powers necessary to the validity of an act of Parliament, viz., the King, the House of Lords, and the House of Commons. It is now used in England to designate any rule or regulation enacted by any authority less than sovereign. In the United States the term is almost exclusively applied to the laws or regulations passed by the common councils, boards of aldermen, or other governing bodies of municipalities. An ordinance differs from a resolution, which is an expression of the will of any organized body, generally to carry out some ministerial act relating to its own internal management or other matter not affecting the general public, as a resolution of respect in honor of a deceased person. The formalities for the enactment, publication, enforcement, and repeal of ordinances are largely regulated by statute. See ACT; BY-LAW; MUNICIPALITY; RESOLUTION; STATUTE.

ORDINANCE OF 1787. An Act of the United States Congress, of July 13, 1787, relating to the government of the Northwest Territory of the United States. See NORTHWEST TERRITORY.

ORDINANCES OF MANU. The English rendering of the Sanskrit *Dharmaśastra*, or code of law, attributed to Manu (q.v.).

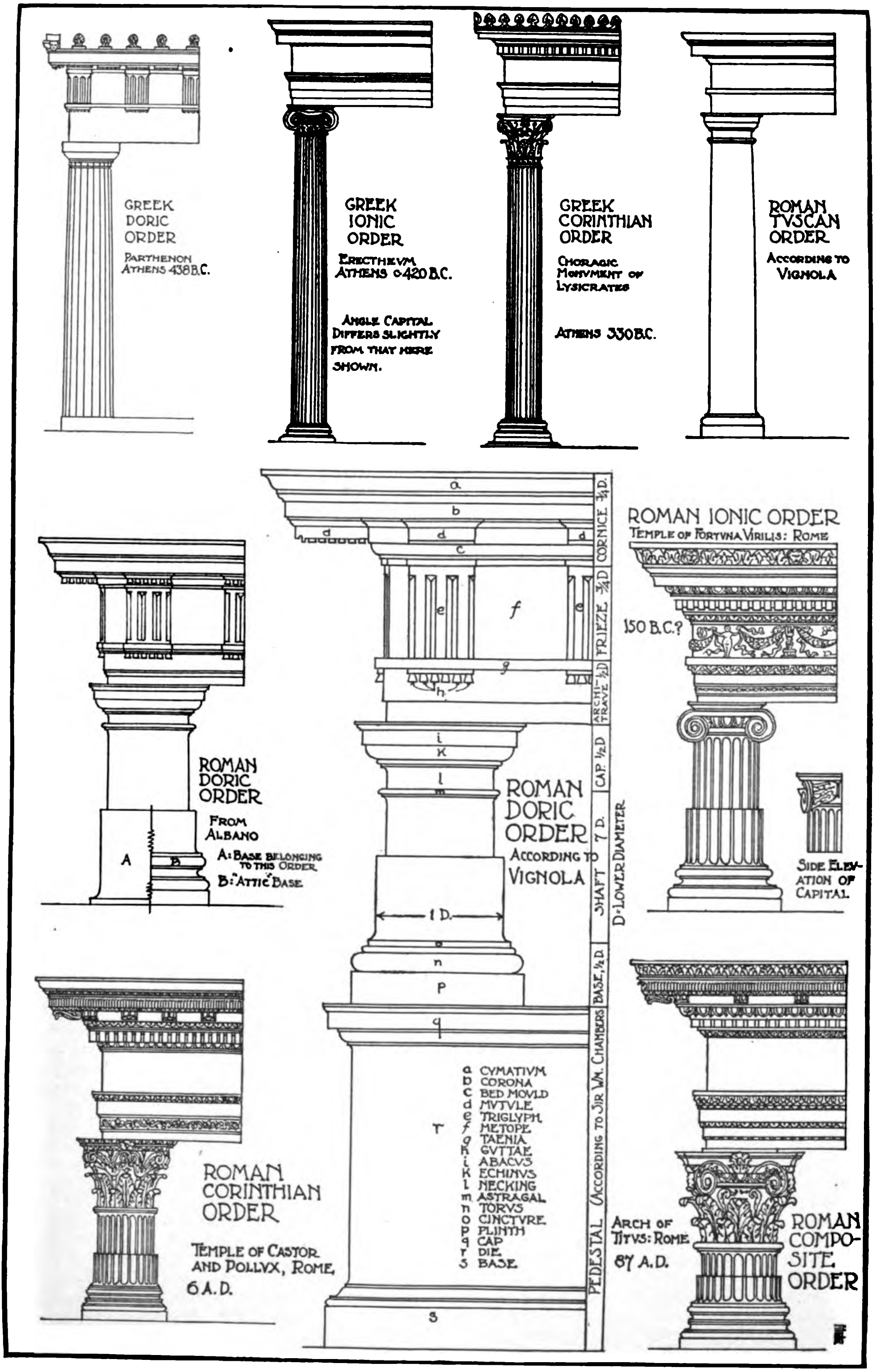
OR′DINARY. A charge in heraldry (q.v.); the principal bearing in coat armor.

ORDINARY RAY. See LIGHT.

OR′DINATE (Lat. *ordinatus*, arranged, ordered, p.p. of *ordinare*, to order). In a system of rectilinear coördinates the coördinate which is measured parallel to or on the y-axis. See ANALYTIC GEOMETRY.

OR′DINA′TION (Lat. *ordinatio*, setting in

ORDERS OF ARCHITECTURE



FOR EXPLANATIONS, SEE TEXT

order, from *ordinare*, to order). The ceremony by which a man is set apart to or invested with an order or office of the Christian ministry. Ordination is a general custom throughout the various Christian bodies, both episcopal and non-episcopal. In the episcopal churches ordination includes as an essential feature the imposition of hands by a bishop. The act of elevating a priest to the episcopate is in strict technical use called consecration, not ordination. In a broader sense ordination includes admission to the minor orders, when the act of admission consists in the delivery of the symbolic instruments. In the various Presbyterian churches the power of ordination rests with the presbytery, who appoint one or more of their number to conduct the ordination service, which includes the feature of the imposition of hands. In the Congregational and Baptist churches ordination is usually performed by the pastors of neighboring churches of the same denomination, but is regarded as necessary only for the preservation of church order, not as conferring any special religious or ecclesiastical authority. See ORDERS, HOLY.

ORD'NANCE (variant of *ordinance*, from Lat. *ordinare*, to order). The word "ordnance" is generally used to designate the various forms of artillery weapons, including guns, carriages, ammunitions, and the necessary implements or accessories. It is sometimes used to include small arms, personal and horse equipment, but this is not strictly correct. The present article includes only the artillery weapons which are too heavy to be fired from a man's shoulder and therefore require a special mount or carriage for supporting or transporting them. The machine gun (q.v.), although usually fired from a mount, is not treated here, it being a modification of the small arm or rifle and in its action differing from it only in that part of the propelling gases are used for ejecting the empty cartridge and inserting a new round.

The two main classes of ordnance material are naturally the gun and the mount or carriage. No matter for what purposes the gun is used, the theories for its calculation, its manufacture, and its use are the same.

Gun. The term "gun" is generally used to include all the various forms which under the modern system are made of different shapes and power, according to the use for which they are intended. These various forms are (1) guns, (2) howitzers, and (3) mortars.

Under guns proper are again the following three classes for land uses, viz., seacoast, field, and siege guns. The gun differs from the mortar or howitzer mainly in that it is a more powerful weapon. For the same calibre, or diameter of bore, it is longer in order that the powder gases may act on the projectile for a longer period, thereby giving it a higher velocity. It may or may not be made to stand a higher maximum powder pressure. It is generally fired at an angular elevation of 15°, although in the last few years carriages are being constructed especially for field artillery purposes, so that elevations up to 40° may be obtained. This is done in order that the maximum range may be obtained, which occurs for any gun at about 43° elevation. It would not be surprising if all countries should within the next few years adopt field guns with elevation up to 40° or over. The two main reasons for this are that the European War of 1914 demonstrated the enormous ranges at which artillery fire can be carried on with the present highly developed observing instruments, the remarkable accuracy of modern guns and powder, and the modern system of indirect fire. Another reason, however, is that the field gun of the future will have to be made to fire against balloons or aëroplanes.

The distinction between the seacoast and the field gun is mainly one of size, the field gun being limited to such a weight that with its carriage it can be transported from place to place.

The most generally used field gun, both in the United States and abroad, is the 3-inch, which fires a projectile weighing in different countries from 14 to 19 pounds with a velocity of about 1700 feet per second; while the largest gun for seacoast defenses is the 16-inch, firing a 2400-pound projectile with a velocity of 2250 feet per second.

The distinction between a field and a siege gun is again one of size only, a field gun being of such a calibre that its weight can be transported with sufficient ease to keep up with small bodies of troops, including cavalry; while the siege gun is heavier and less mobile and generally requires that the gun be placed in a traveling position, either on its own or on a second carriage. The largest siege gun used in the European War of 1914 was the 28-centimeter (11 inches approximately). In the early months of the war there were many references to the German 42-centimeter (16-inch) siege gun. There were undoubtedly some of these, as well as even larger ones, in existence, but notwithstanding their effective use it is doubtful whether they will ever be generally adopted, mainly for the reason that in modern warfare, where only temporary fortifications will be thrown up, their use will be very rare, and also because of the difficulty of transportation.

The mortar may be used for seacoast defenses or for siege purposes. In the former case it is mounted on a fixed carriage, while in the latter it is fired from a mobile mount. In either case the main distinctions from the gun are that it is shorter and fires at a lower velocity and generally at higher elevations, up to 65° and 70°. See MORTAR.

The howitzer is generally a mobile gun, although in some cases it may be placed on pedestal mounts. It differs from the ordinary field gun in that it is shorter, fires with a lower velocity, at elevations up to 40°, and is generally so arranged that by varying the powder charges a steep slope of fall may be obtained for the projectile for any range. It is especially adapted for firing against or behind earthworks, where the projectile from the gun with its flat trajectory cannot reach. Originally it was not intended for firing against personnel, but during the European War it was very often used for that purpose, and was remarkably effective with the use of what is known as the universal shell. For more detailed description of calibres and weights of various guns and howitzers, see AMMUNITION; ARTILLERY; COAST ARTILLERY; FIELD ARTILLERY; SIEGE; SIEGE WORKS.

Considering all the various forms of artillery weapons under the generic term "gun," the present article aims to show the development from the inception of the idea, together with theories involved in modern gun construction and methods used in manufacture.

There is little doubt but that the idea of machines for throwing masses has been used as long as bows and arrows or sling shots have been employed. Certain it is that machines for throwing heavy masses were employed centuries before the Christian era. We find historical reference to the use of the scorpion by the Cretans, the catapult by the Syrians, and the ballista by the Phœnicians. In the Bible, in Chronicles, it is stated that the walls of Jerusalem were armed with machines for throwing arrows and large stones (c.800 B.C.). Two centuries later Ezekiel menaced the Holy City with ballistæ.

In actual operations the stones or burning liquids to be hurled at the enemy were suspended from the end of a beam. This beam was actuated either by a weight hung from the other end or by the force of a compressed helical spring. For several centuries this spring was made of catgut. Owing to atmospheric conditions, its strength was difficult to regulate, and a great improvement was made about 120 B.C. when the famous engineer, Ctesibius, replaced it by a spring made of bronze.

These machines were used continually until after the invention of gunpowder and even after the introduction of firearms. Their energy perhaps can be easily imagined. At first they fired smaller stones or masses weighing only a few pounds, with which they obtained ranges up to about 350 yards. The power, however, increased, and in the siege of Stirling, in 1303, Edward I used ballistæ throwing stone shots weighing 300 pounds.

It is evident that these machines resembled firearms only in that they were intended for hurling large masses. The development of gun construction as at present understood, therefore, had its origin in the first mortar, which was devised after the discovery of gunpowder. Notwithstanding the fact that credit for the discovery of gunpowder about 1330 is generally given to Berthold Schwarz, it is quite certain that combustible mixtures and fireworks were used long before, and that it was in ancient China that saltpetre first was added to such combustible mixtures and gunpowder was really discovered. This knowledge the ancient Arabs borrowed, and it is probable that during the second and third centuries they were the first to employ this mixture for propelling small projectiles. In fact the inventor of the firearm seems to have been the unknown Arabian soldier who first conceived the idea of putting this mixture in a tube and used it for propelling a small stone.

In spite, however, of such early work in the East, it is certain that the use of guns as now understood did not become general to the exclusion of catapults and ballistæ until after the accidental discharge of a stone on top of an apothecary's mortar in which Berthold Schwarz had mixed a composition of saltpetre, charcoal, and sulphur and into which by accident was thrown a spark which ignited the mixture and threw the stone into space with great violence. Therefore from about this time dates the use of guns. The early shapes were very crude, and it was only natural that the first should be made to resemble the shape of the apothecary's mortar which by accident served to show the possibilities of guns.

In the first guns made little consideration was given to details. The only thing that seemed to be essential was a tube closed at one end, into which the powder was placed and on top of which was laid the stone or iron projectile. The strength of the tubes was not calculated, and it is not surprising that with the unreliable powder used the guns frequently burst, causing injury to the personnel. Lindsay of Pitscottie, about 1728, wrote concerning an accident that befell King James II of Scotland as he was standing near a piece of artillery, that "his thigh-bone was dung in two with a piece of misframed gun that brake in shooting, by the which he was stricken to the ground and died hastily."

It was soon realized that to give better direction to the projectile the interior of the tube must be made more nearly cylindrical, and the first mortar-shaped gun was soon replaced by the bombard, which was longer than the mortar, but nevertheless was still at first made with a tapering bore. The material used for this type was wrought iron or bronze. Some of the bombards were made of staves tied together with strong hoops.

To follow the nature and construction of the various types of guns as used during the years until the middle of the nineteenth century is interesting but perhaps not very instructive. They were increased in size and weight in order that they might be stronger and be able to throw the projectiles further. A brief outline of these guns is given under ARTILLERY, and the subject may be followed further in the authorities there cited.

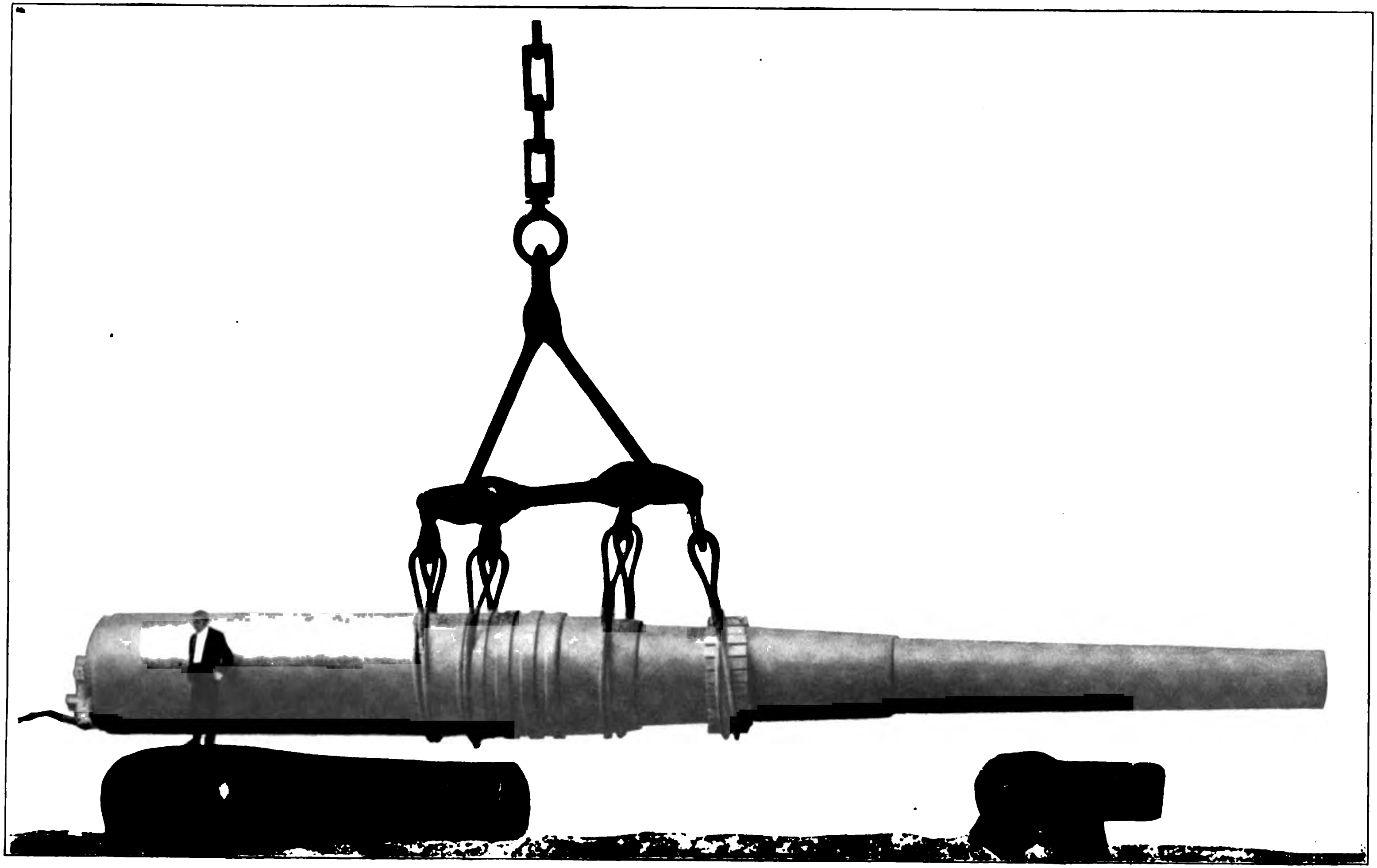
By the seventeenth century, or 100 years before the American Revolutionary War, the desire to obtain cannon capable of discharging the heaviest possible shot gave way to considerations of handiness, accuracy, and range, and led to the development of guns of smaller calibre but greater length which threw shot not exceeding 150 pounds. These naturally involved some consideration of their construction, and thus there was a beginning of modern ordnance. While the ancient guns were generally made with elaborately designed exterior walls, it is quite remarkable that until about the middle of the nineteenth century, when cannons were made of cast iron, no really great improvement in the design and manufacture was noticeable. It is probable that the advance in the method of manufacture of steel as developed during the last half of the nineteenth century is to a great extent responsible for the improvement in guns and carriages. On the other hand, the results obtained with the slower-burning smokeless powder, together with the reliable pressures developed by it, made it possible to approach in gun construction to within such a margin of the elastic strength of the material as was not to be considered in the old cast-iron guns.

The three most important improvements in modern gun construction may be considered under the following:

1. Principle of built-up guns.
2. Rifling.
3. Breech block.

Principle of Built-Up Guns. The principle of built-up guns depends on the following. A gun has to withstand three kinds of stresses: (*a*) a pressure radially outward, (*b*) a force tending to stretch the gun longitudinally, (*c*) transverse stress due to the weight of the parts of the gun on opposite sides of the point of support. The first, tending to enlarge the bore, stretches the metal circumferentially. It also compresses the inner layer of the metal. The

ORDNANCE



UNITED STATES ARMY 16-INCH BREECH-LOADING RIFLE
Weight, 285,000 pounds; weight of projectile, 2,400 pounds

20-INCH RODMAN SMOOTHBORE
Weight, 116,000 pounds; weight of projectile round shot, 1,000 pounds

300-POUNDER 10-INCH PAROTT RIFLE
Weight, 26,000 pounds; weight of projectile, 300 pounds

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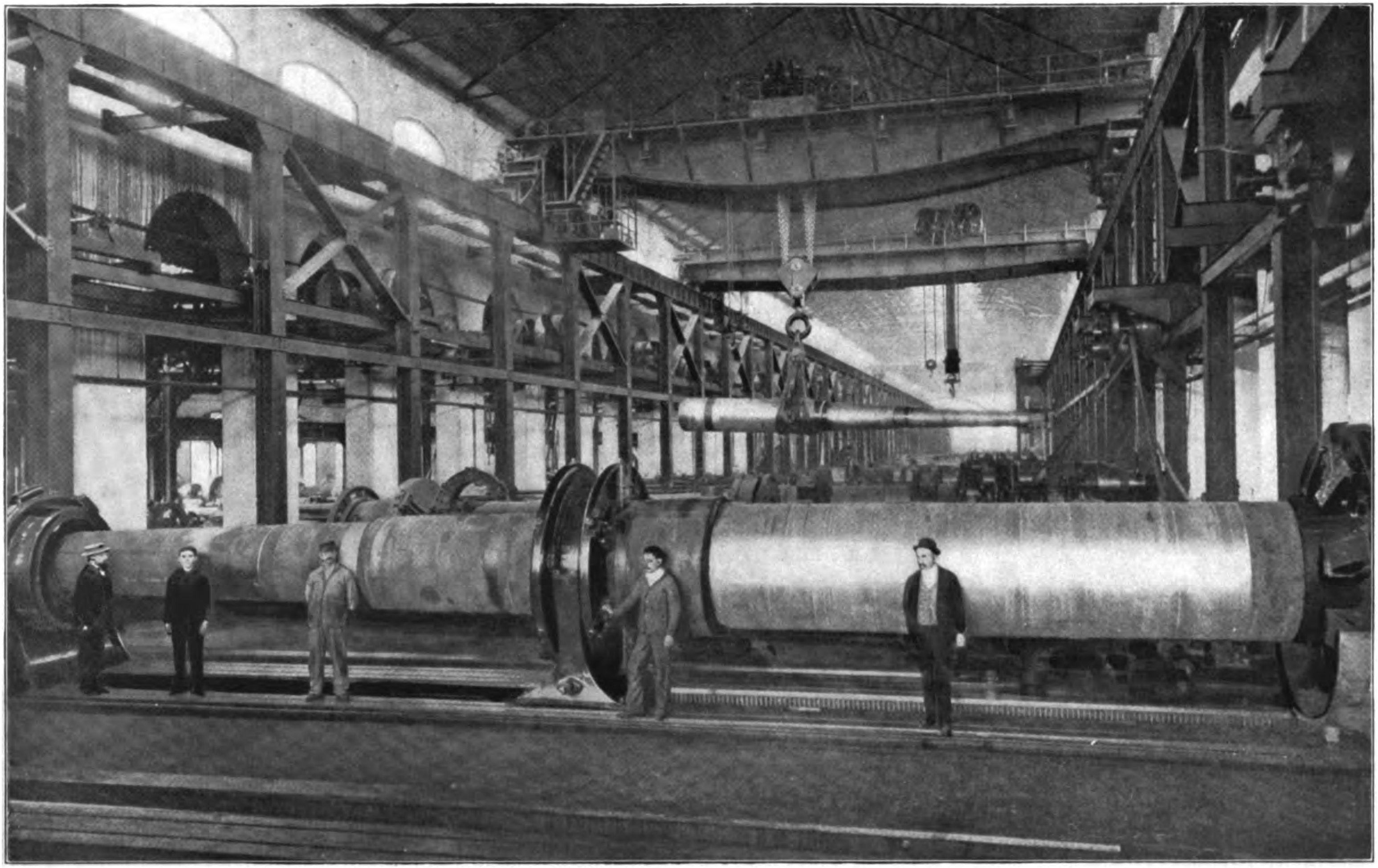


AN ORDNANCE SHOP FOR MAKING LARGE GUNS

A 16-inch breech-loading rifle is in the lathe. A 12-inch breech-loading rifle is suspended from the crane force tending to stretch the gun longitudinally is due to the fact that the projectile being forced through the bore offers a large frictional resistance, and the inner tube must be made strong enough to take this pull.

The stress due to bending or drooping of the muzzle is important for consideration in wire-wound guns only, since built-up or solid guns, if made strong enough to resist internal pressures, are strong enough to prevent dangerous bending.

In the following only the stresses tending to stretch the metal circumferentially are considered, since the other stresses are comparatively simple to determine. The powder pressure is at a maximum before the projectile has moved more than a few inches, but falls off as the projectile moves forward. When the size of the interior of the gun and the conditions of loading are determined, the intensity of the pressure to be expected at each point along the bore is calculated and a pressure curve plotted.

To determine the tangential strength of a gun:

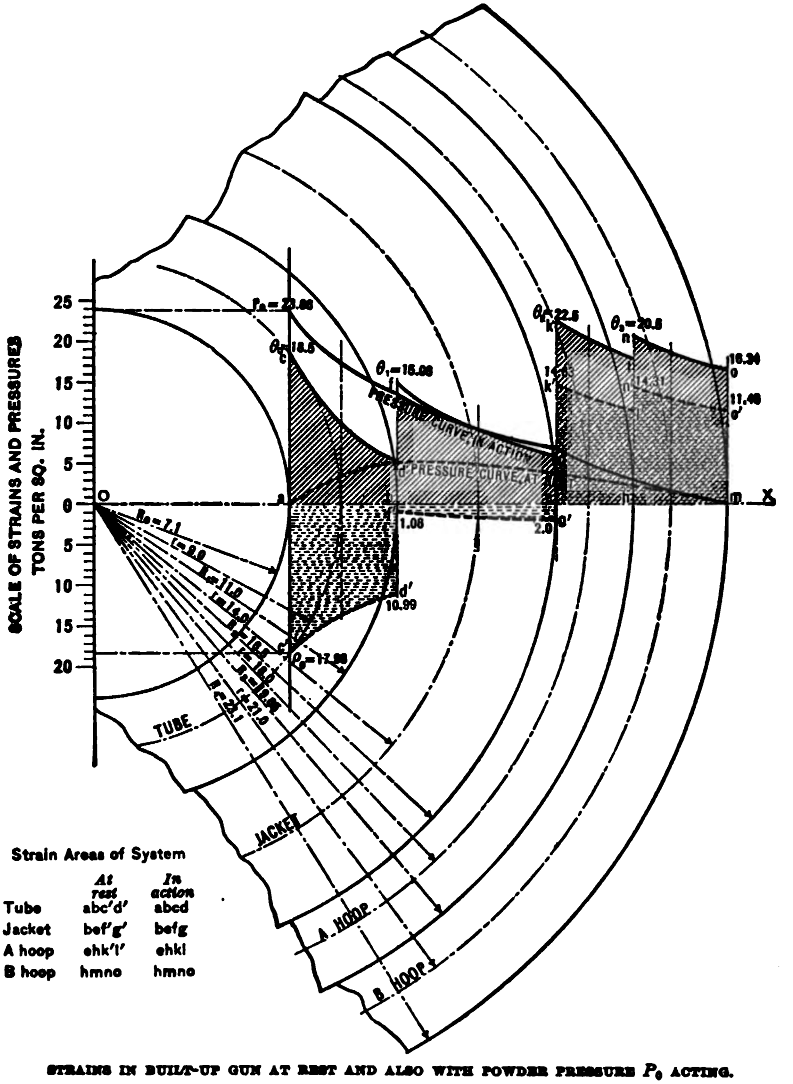
Let R_0 = interior radius of a gun,
R_1 = exterior radius of a gun,
P_0 = unit pressure in interior of gun due to powder pressure,
P_1 = unit pressure on exterior of gun,
S = unit stress in the metal of the gun in tangential direction,
r = radius of any point between R_0 and R_1.

It can be shown mathematically that

$$S = \frac{2}{3}\,\frac{P_0R_0^2 - P_1R_1^2}{R_1^2 - R_0^2} + \frac{4}{3}\;\frac{R_0^2R_1^2(P_0 - P_1)}{R_1^2 - R_0^2}\,\frac{1}{r^2}$$

By substituting in this formula values for R_1, R_0, P_0, and P_1 we find that:

(a) Assume $P_1 = 0$; S decreases as r increases, which means that if no pressure is exerted on the outside of a tube or gun, the strain in, or stretch of, the metal due to an internal pressure P_0 is greatest at the inner wall and decreases towards R_1. This pressure is indicated by the curve *acdb*, on the accompanying figure.



STRAINS IN BUILT-UP GUN AT REST AND ALSO WITH POWDER PRESSURE P_0 ACTING.

(*b*) Assume $P_0 = 0$; then S becomes negative, which shows that the metal is under compression. Also, S increases algebraically with r. This is interpreted to mean that if there are no powder gases acting in the bore, and the external pressure P_1 is applied to the outside of the gun, the unit strain of compression is greatest at the inner wall. The curve of compression is represented by $a'd'd''b$.

(*c*) If, now, P_0 and P_1 are both acting at the same time, it will be evident that these pressures can be so regulated that the strains in the metal due to one will be neutralized entirely or in part by that due to another.

It is on the law expressed under (*c*) that the principles of modern gun construction depend, since, if an external pressure is applied to a gun, the strains which would ordinarily exist near its inner wall without the external pressure will, by using it, be greatly reduced, thereby permitting additional increase in unit powder pressure in the bore.

The idea of using this principle in construction was unquestionably originated by American men. Prof. Daniel Treadwell, in 1841, designed a gun made of rings or hollow cylinders placed one over or around the other and welded together. In 1849 a cast-iron gun was tested in which the Rodman method of casting was used. This method consisted of putting initial compression in the inner wall by cooling the interior while the exterior was still kept hot. By this means the inner elements of the gun were compressed by the contracting on cooling of the outer part of the cylinder. Chambers, in 1849, patented a gun of wrought iron provided with strengthening hoops.

It is evident that for any pressure due to the burning of the powder the walls of the gun must be such as not to stress the metal beyond its elastic limit for compression or tension. Consider such a gun and let θ and ρ represent the elastic limit of the metal under extension and compression respectively. Understanding by a simple gun one composed of a single tube without initial tension and by a compound gun one of a built-up construction, the value of P for different cases will be, by substituting in the above formula:

Simple Gun.—Tangential resistance.

Making $P_1 = 0, \quad S = \theta, \quad r = R_0,$

$$P = \frac{3(R_1^2 - R_0^2)}{4R_1^2 + 2R_0^2}\theta.$$

Compound Gun.—Tangential resistance. Since here the metal is first compressed by an external force, which permits it a wider range before the elastic limit for stretch is reached,

$$P = \frac{3(R_1^2 - R_0^2)}{4R_1^2 + 2R_0^2}(\rho + \theta),$$

or for $\theta = \rho$,

$$P = \frac{3(R_1^2 - R_0^2)}{2R_1^2 + R_0^2}\theta.$$

These formulas embody the principle that the resistance is limited by the displacement of the metal at the surface of the bore, where (within limits of practice) the strain is greatest. The simple tube will fail by tangential extension only. The resistance of the compound tube will be proportionate to its initial compression.

From these formulas it may be seen that the resistance increases with the thickness of wall, but with diminishing increments which become relatively small after a thickness of from 1 to 1¼ calibres is reached.

The limiting values of P for an infinite thickness of wall, making $R = \infty R_0$, become: simple gun, $P = 0.75\theta$; compound gun, tangential resistance, $P = 1.5\theta$.

The elastic resistance of a simple gun cannot, then, exceed a pressure on the unit of surface equivalent to three-fourths of the elastic limit of the material under extension. Eighty-four per cent of the possible strength is attained with a thickness of 1 calibre and 91 per cent with 1½ calibres. The proportionately greater strength of the relatively thin tube is due to the distribution of the tangential strains throughout the thickness of the wall.

A maximum resistance corresponds to such an arrangement of the system that when the interior pressure is applied all the members will be simultaneously strained tangentially to their elastic limit, and it is the object of initial tension to secure this arrangement as nearly as may be practicable.

The above laws also will evidently apply when a hoop placed on the outside of a gun tube and exerting a pressure of compression on it is itself strengthened by adding pressure on its outside, and so on, within limits of practical construction.

Construction of Built-Up Steel Cannon. The material of which modern guns are made is generally a low-carbon steel containing about one-half of 1 per cent of carbon. In the United States it is made by the open-hearth process. (See IRON AND STEEL, METALLURGY OF.) In Germany crucible steel is used. Bessemer steel is practically debarred, because it is not pure or sound enough for use in cannon. The steel is cast into ingots roughly approximating in shape the pieces to be made from them, but larger. United States army specifications require about 30 per cent at top and 6 per cent at bottom of the ingot to be discarded.

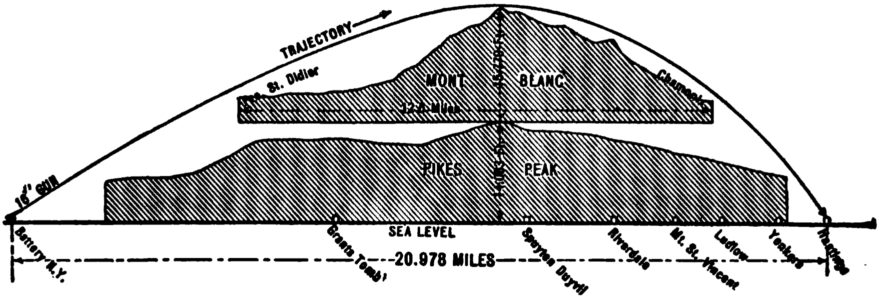
After the ingot is cast it is cooled very slowly to avoid strains, and then the surplus portions are cut off and specimens taken for chemical analysis and tensile test. The remainder of the ingot is now bored in a lathe, then heated and forged on a mandrel. The specifications require that after forging the strains due to this operation be removed by annealing. The forging is then turned and bored in a lathe to nearly its finished size and specimens taken for test. It is then oil-tempered, which improves its physical qualities. This process is apt to induce strains in the metal, to remove which the forging is required to be again annealed.

Tubes are bored in a lathe with a long boring bar fed into the tube, which rotates while the bar remains stationary. The tool carried at the end of the bar is a hog-nose or semicylinder of cast iron, which, by its pressure on the bore, already cut, steadies and supports a cutting tool at its forward end. The bore thus produced is straight (within a small fraction of an inch in the whole length of the tube), but rough, and is smoothed by a reamer, a cylinder fitting the bore tightly and carrying long side cutters. During or after the boring the outside of the tube is turned to diameters greater by the calculated shrinkages (about 0.0003 of the diameter) than the inner diameter of the hoop to encircle it. (The operations upon jackets and hoops are in general similar to those upon tubes.)

When ready for assemblage the hoop or

jacket to be put on is heated in an oven (generally in a vertical position, in an oil furnace, to about 800° F.). This expands the metal to about 0.08 inch larger diameter than the part it is to surround. It is then lowered over the latter, which stands in a vertical position, until it abuts against a shoulder on the tube. In order that it shall not in cooling grip the gun higher and draw away from this shoulder, water is poured on the hot hoop near the joint to cool it there first, and then the water ring is gradually moved up to produce progressive cooling through the whole length of the hoop. The gun, as it begins to be called as soon as any pieces have been assembled on the tube, then goes to a lathe to have the surface turned for the next hoops to be shrunk on.

The sequence of assemblage of the jacket and the hoops is dependent upon the system used to transfer the longitudinal forces to the trunnion. In mortars generally, and in some guns, the tube is run through the jacket from the rear until its shoulder abuts against one in the jacket. In most 8-inch, 10-inch, and 12-inch United States guns the C hoops (covering the chase or muzzle portion) are first put on from the front of the tube, then the jacket is put on from the rear. This results in both jacket and hoops being held from sliding off the ends of the tube by their grip only. The grip is very great, but is not regarded as sufficient security, and an L hoop, or locking hoop, having a portion of its bore near the centre of greater diameter than the bores at each end, is put on. This portion corresponds to a raised shoulder on the forward end of the jacket and one on the rear of the first C hoop, thus binding them together. The L hoop is expanded sufficiently to allow its smaller diameters to pass over these raised shoulders in assemblage. The trunnions are forged solid with the trunnion hoop, which is assembled upon the gun by shrinkage like any other hoop. When all hoops have been assembled the gun, after a careful inspection for dimensions and straightness, is finish-bored to its proper calibre, turned to the prescribed shape outside, rifled, and the powder chamber, forcing slope, and breech recess finished.



TRAJECTORY OF 16-INCH U.S.A. GUN.

Height of parabola, 5¾ miles. Weight of projectile, 2,400 pounds. Powder charge, 667 pounds.

The powder chamber is in the rear of the rifled part of the gun and is of slightly larger diameter. Forward of this cone is the rifling, but, to prevent excessive pressures due to instantaneously overcoming the whole resistance of the rotating band to taking the rifling, it is customary to ream off about half of the depth of the lands (or ridges of metal between the rifling grooves) at this point, and this reaming is done in the form of a cone several feet long, so that the increase in height of the lands shall be gradual throughout this distance. The breech recess is the part in the rear of the tube which is threaded and slotted for the breech block.

It is evident that for work of such a character the machines, appliances, and tools must be very accurate. A short description of probably the most powerful gun so far built, viz., the 16-inch United States breech-loading rifle, intended for the Panama fortifications, may be of interest.

The dimensions in inches of this monster gun, weighing 130 tons, are given herewith.

The gun requires a powder charge of 667 pounds. With a maximum powder pressure of 38,000 pounds to the square inch the gun will throw a projectile weighing 2400 pounds with a muzzle velocity of 2250 feet per second, developing a muzzle energy of 84,000 foot tons. Its projectile will, at 10,000 yards' range, penetrate a Krupp armor plate of nearly 17 inches' thickness. A spectacular feature in connection with this gun is its enormous range, which is about 21 miles at a maximum elevation. For an elevation of 15° it will have a range of 18,580 yards. To give a graphic picture representative of the range the *Scientific American* recently prepared the accompanying profile showing Pikes Peak, Colorado, with Mont Blanc superposed above it, the combined height of the two mountains being 29,926 feet. As the extreme height of the trajectory of the 16-inch gun is 30,516 feet, or above 5¾ miles, it will be seen that it would rise higher than the combined height of these two mountains by 590 feet. On the base line of the profile are marked various well-known localities between a line on the Battery, New York City, to Hastings upon Hudson, with the distance shown in miles.

The total length of this gun is 590.9 inches (49 feet, 2.9 inches), with a diameter of 60 inches at the rear portion, the forward part gradually diminishing from 60 inches to 28 inches at the muzzle. The gun is built up of the following parts:

A tube, 566.5 inches long, with a maximum outside diameter of 29.3 inches; two C hoops, which are shrunk over the tube from the forward end of the jacket to the muzzle. The jacket is 304.65 inches long and is shrunk on the rear portion of the tube from the end of the C hoop; the rear end of the jacket, for a length of 24.4 inches, overhangs the tube and forms the breech recess. The D hoop, which is 144.5 inches long, is shrunk over the forward end of the jacket and the rear part of the C hoop; its bore contains two locking shoulders, which grip over two corresponding shoulders on the jacket and C hoop, thus interlocking the whole system and preventing any possible sliding backward of the jacket or sliding forward of the C hoops, due to the shock of firing. Three A hoops are next shrunk on; the A1 hoop overlaps the rear part of the D hoop with its front end and the outer surface of the jacket with its rear end; the hoops A2 and A3 are shrunk directly over the outer surface of the jacket. The B hoops are shrunk outside of the A hoops.

The Tube.—The tube was made from a nickel-steel ingot, octagonal in section, weighing about 100 tons. The ingot was cast from the product of three open-hearth furnaces. A discard of about 44 tons was cut from the top and about 8 tons from the bottom of the ingot, leaving a block 188 inches long, octagonal in section, which was used to make the tube forging. A hole was bored longitudinally through the axis of this block, after which the block weighed about 50 tons. From this block the tube was forged hollow on a mandrel under a 14,000-ton hydraulic press; the forging being of sufficient total length to provide the necessary test metal. The completed forging was then rough-turned and bored over its entire length, including the extra length for testing. The tube as rough-machined was next submitted to treatment in order to give the metal the necessary physical qualities. The treatment consists of tempering, i.e., hardening in oil and annealing.

Physical Qualities. Four specimens 0.564 inch in diameter and 3 inches long between measuring points were cut from each end of the tube and showed the following physical qualities:

Elastic limit	51,375 pounds per square inch.
Tensile strength	84,350 pounds per square inch.
Elongation	20.38 per cent.
Contraction	41.93 per cent.

The jacket and hoops were made in a similar manner.

Wire-Wound Guns. It will be noted from the discussion of the built-up and single-tube guns that the various cylinders are strained to higher limits at the interior surfaces and that the amount of strain is less towards the outside. It is apparent, then, that if the same thickness of wall is composed of a greater number of cylinders, more of the total strength of the metal would be utilized. To obtain such a condition there has been devised the system of wire-wound guns, in which wire under tension is wound around the tube of the gun.

In the manufacture of wire-wound guns the tube must be machined as for the built-up gun. It is then wound by rotating it in a lathe while the wire is fed from spools through a machine, giving the wire the tension calculated therefor. Whatever jacket and hoops are to be used in the design are shrunk on exactly as in built-up guns. The tension of the successive layers of wire may be so regulated that each layer will be strained to its elastic limit when the system is in action. Usually, however, the wire is wound with uniform tension. In the form of wire the metal in the gun is more likely to be free of defects, and can be given a much higher elastic limit than when in the form of forged hoops. An elastic limit of over 100,000 pounds is obtained in steel gun wire.

In the Brown wire-wound gun the wire is wound with a tension of 112,000 pounds per square inch, compressing the inner surface of the tube beyond its elastic limit without apparent injury. This gun is composed of a lining tube about which are wrapped overlapping sheets of steel ¼ inch thick. The steel sheets form about the lining tube an outer tube, which is afterward wrapped with wire from breech to muzzle. The wire-wrapped overlapping sheets give longitudinal stiffness to the gun. Over the wire is shrunk a steel jacket with just sufficient tension to prevent its rotation upon the tube. The jacket is not depended upon to add to the tangential strength of the gun. It takes, however, a part of the longitudinal stress.

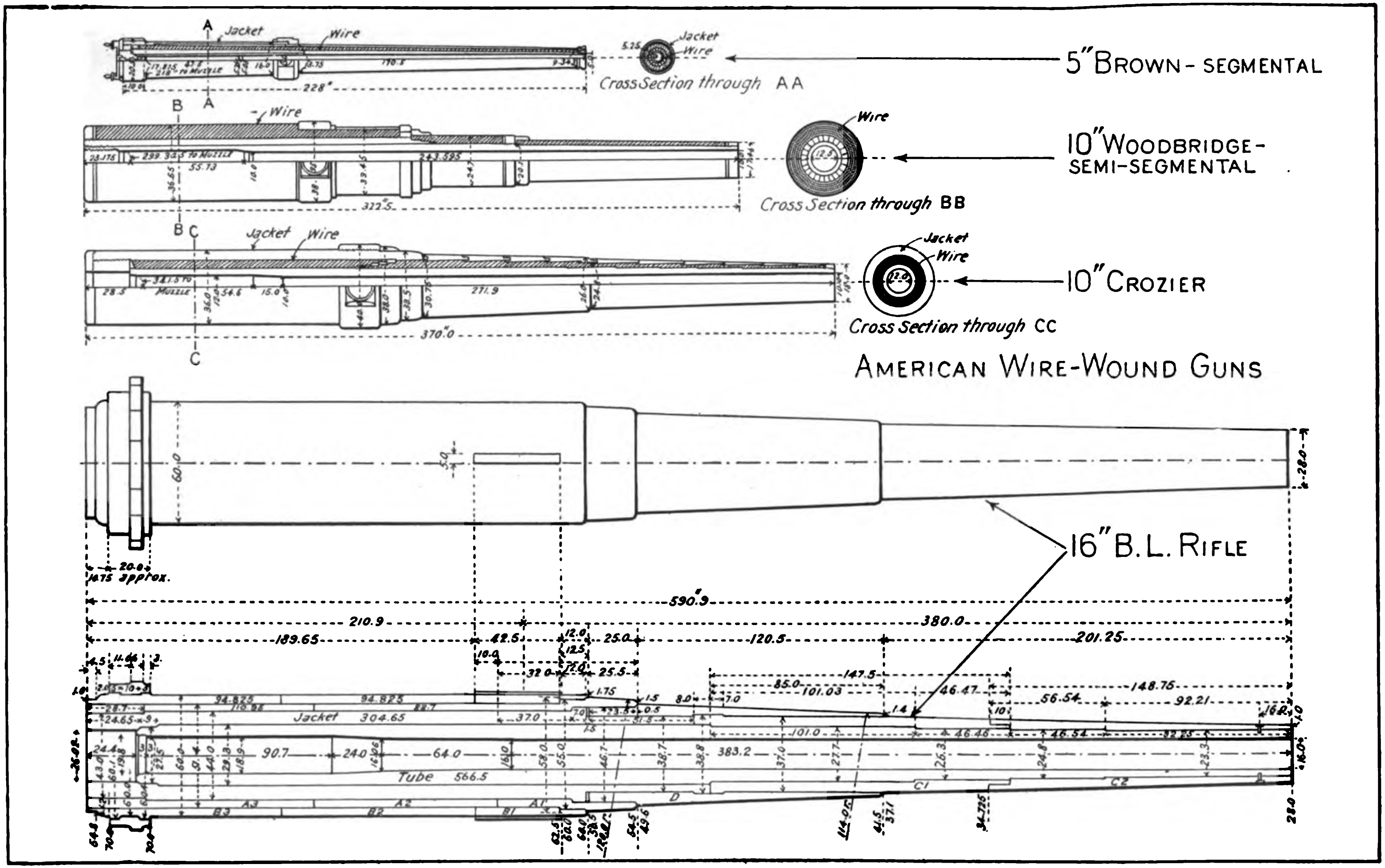
The United States wire-wound gun uses a wire $\frac{1}{16}$ inch square, wound with a uniform tension of 47,400 pounds per square inch. The wire winding extends over the breech and halfway along the chase of the gun.

Rifling of the Gun. It was long recognized that if a rotational velocity could be given to the projectile, the gyroscopic effect would steady it in its flight, insuring longer and more accurate ranges. In 1742 Benjamin Robins (*New Principles of Gunnery*) advocated the use of rifled barrels for steadying the projectile in its flight. Before the introduction of the breech-loading gun, however, this was difficult of accomplishment, since the projectile had to be inserted from the muzzle. During the American Civil War about one-third of the guns were rifled. To make the projectiles grip these rifling grooves on the inside of the bore a soft cap of metal was placed at the base. The powder pressure acting on this lead, or similar substance, flattened it outwardly, thereby forcing it into the grooves and giving a rotational velocity to the projectile.

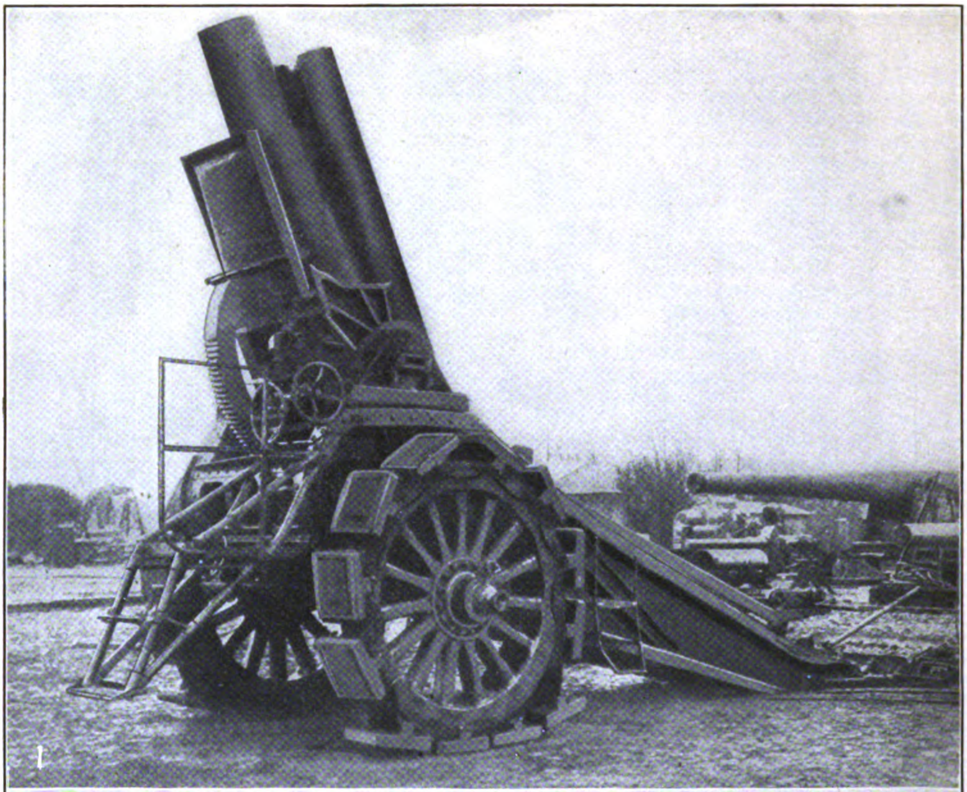
In modern breech-loading guns spiral grooves are cut in the inner wall of the bore. The projectile is of a diameter equal to the diameter of the raised portion of these spirals, called the lands, while a copper rotating band is fastened to the projectile, the outside diameter of which is equal to the distance between the bottom of the grooves. When the projectile is forced through the bore the lands cut into this copper band, causing the projectile to receive a predetermined rotational velocity. In order that the force to rotate the projectile may be as small as possible, the slope of these spiral rifling grooves is generally made increasing, varying from one turn in 50 calibres at the breech to one turn in 25 at the muzzle. To machine these rifling grooves a cutting tool is forced through the bore and rotated by a rack meshing with a pinion on the shaft of the tool. As the tool, with rack and pinion, is forced towards the gun the rack is pushed towards the lathe by means of a stud fixed to it and sliding in a cam groove of the slope of the desired developed rifling groove. The rotational velocity of the 16-inch projectile is 4050 R.P.M.

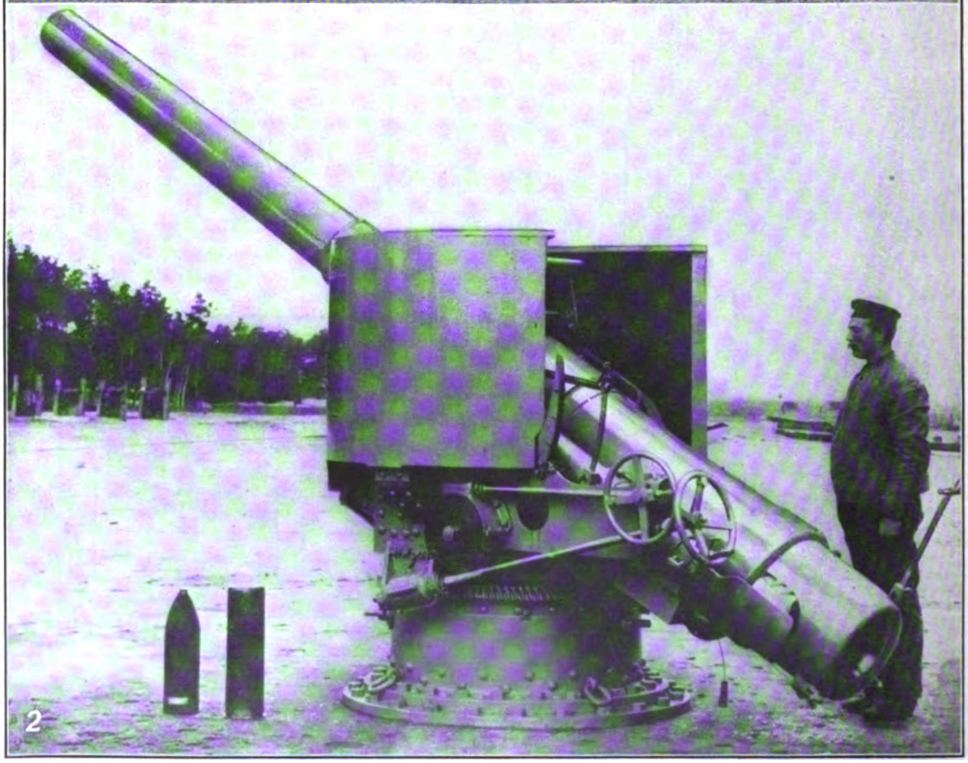
Breech Blocks. Although breech-loading and breech-closing guns are generally associated with modern times only, there are ample records to show that breech blocks were used centuries ago. There is at Woolwich, England, a barrel, made in 1547, which is fitted for breech loading. This barrel is also provided with rifling grooves having a twist of one turn in 26 inches.

Breech-closing devices, however, were not developed for a long time and were not seriously considered until about the middle of the nine-



CROSS SECTIONS OF AMERICAN WIRE-WOUND GUNS AND SIXTEEN-INCH BREECH LOADING RIFLE

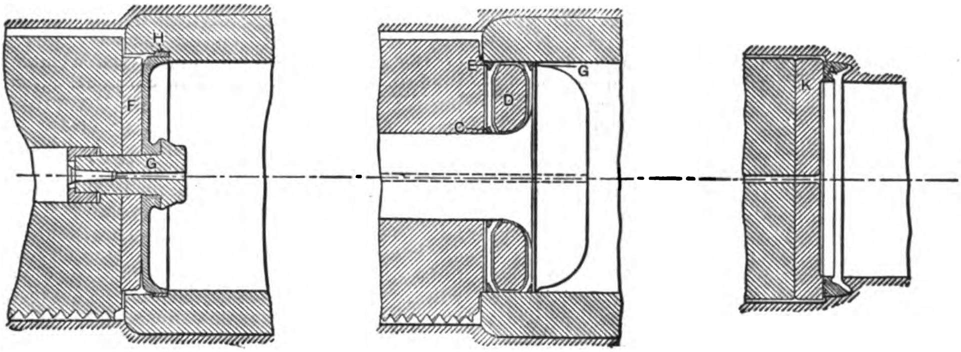




1. GERMAN 11-INCH SIEGE GUN OF 1914. IN FIRING POSITION
2. KRUPP 6-INCH RAPID FIRE GUN ON PEDESTAL MOUNT AS USED ON SHIPBOARD

(Photographs Copyright by Underwood and Underwood, New York) teenth century. In the American Civil War all the guns were still muzzle loaders.

The two main subdivisions of breech blocks as used to-day are the sliding block and the interrupted screw types. The former is also called the Krupp system, while the latter is a modification of the French system of rotating blocks.



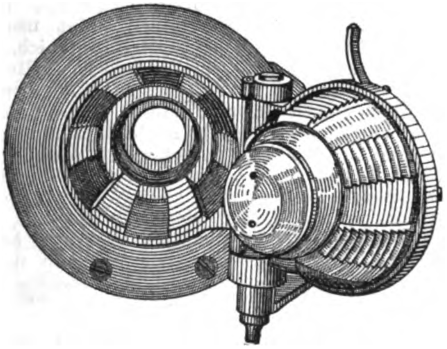
Elswick Cup

De Bange Obturator

Broadwell Ring

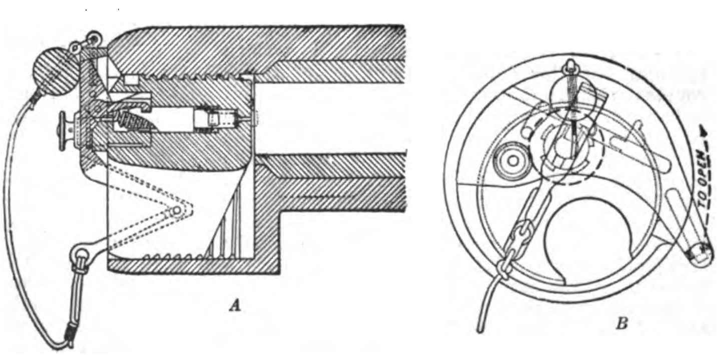
SYSTEMS OF OBTURATION.

In 1858 Armstrong's 32-pounder rifled breech-loading guns, introduced into the English navy, had a transverse block supported by a longitudinal screw block bored out to permit loading when the transverse block was removed. About the same time Krupp had a breech-loading system of transversely sliding wedge-shaped block, essentially his present system. In 1849 Chambers (United States) patented a longitudinal screw block with interruptions in the threads that permitted it to be slid to the rear after only a partial rotation. This is the present American system. The French developed the idea in their naval and land service in 1870, calling it the Reffye mechanism.



BOFORS RAPID-FIRE BREECH MECHANISM.

Both the Krupp and the French breech-loading systems, as well as many others, were tried in the United States before the final adoption of a modification of the French system. In the earlier guns much difficulty was experienced with gas checks. Various systems of obturations were tried, of which the Krupp and the De Bange were the most successful. Krupp uses a ring of steel, the thin edges of which being pressed by the gas prevents its escape. The De Bange check, used by the French and named after the French general De Bange, is a plastic pad of asbestos flour and tallow, held in a canvas bag, which, being pressed back by a spindle receiving the powder pressure, is spread tightly against the walls of the bore, sealing the joint.



NORDENFELT ECCENTRIC BLOCK BREECH MECHANISM FOR RAPID-FIRE GUNS.
A, longitudinal vertical section. *B*, section through breech.

The system used in the United States and which has been most successful is a modification of the De Bange system, and consists of placing steel split rings, one in front and one in rear of the gas check pad. These rings are slightly larger in diameter than the corresponding diameters of their seats in the conical surface of the gun tube. In this manner they are always against the walls and tend to seal the powder chamber. On firing the powder pressure acting against the mushroom head of the obturator compresses the gas check pad, thereby forcing the rings further against the surface of the tube and effectively preventing passage of gas to the rear. In guns using fixed ammunition the cartridge case acts as the obturator in that the powder pressure forces the brass walls of it against the wall of the chamber and effectively seals it.

The breech mechanism for heavy guns is operated by a continuous rotation of a single crank in one direction, which, by means of a combined spiral and spur gear, first rotates the block to bring the threaded sectors opposite the open ones of the gun, then draws the block to the rear clear of the gun, and finally swings it to one side on a tray hinged to the gun. These three motions are always necessary to the withdrawal of the interrupted screw block. In guns of 6-inch calibre and less, in which the blocks are much shorter than in guns of larger calibres, they are accomplished by a single quick motion of a crank connected by links, gears, or otherwise to the block so as to accomplish the rotation, withdrawal, and swinging successively and automatically. An adaptation of the screw block is the Nordenfelt eccentric block, which is not withdrawn at all, but being rotated about a centre not in the axis of the gun, a hole in the block can be brought opposite the bore for loading, or the bore may be closed by the solid part of the block, while the block is at all times held by circular grooves and cuts in its housing. This is the type of block used in the French 75-millimeter field gun, which did such wonderful service in the European War of 1914.

Carriages. Gun carriages are either stationary (as seacoast) or mobile (siege and field); as to mode of action, barbette, disappearing, and field carriages. The main function of a gun carriage is to support the gun during firing; its secondary function is to provide for pointing the gun. Mobile carriages must also possess the attributes of vehicles.

Considering the above functions of a carriage, it is evident that so long as guns have been used carriages also must have been provided. For the first few centuries the distinction as to-day made between mobile and stationary carriages did not exist, and the carriages were generally intended for use in moving the guns from one place to another. The strength of them, however, was such that, except for guns firing very light stones or projectiles, the carriages had to be placed on the ground for firing. It was not until about the middle of the nineteenth century that the construction of carriages was begun on a scientific basis. It is probable that the improvement in the manufacture of steel, with which enormous strength for a comparatively light weight is obtainable, was greatly responsible for this. Another important factor, however, is that with modern smokeless powder one can calculate with nicety the developed forces, and by mathematical formulas determine accurately the stresses in the various parts of the carriage and design them accordingly.

In order to reduce the stresses all modern carriages, both for field, siege, and seacoast, are provided with what is called the hydraulic recoil mechanism. The object of this mechanism is to distribute the shock due to the firing of the gun over a longer path, thereby reducing the force transmitted to the carriage. For example, in a 3-inch field gun the powder pressure acting on the base of the projectile is approximately 230,000 pounds. This same force is naturally acting on the gun also, tending to force it to the rear. If the carriage were held rigidly and no movement were given the gun, the various parts of the carriage would have to be made to stand this force of 230,000 pounds. By allowing the gun to recoil on its carriage, thereby giving it a velocity rearward, this force is reduced in a degree corresponding to the length of recoil, and by allowing a recoil of say 45 inches the force to be transmitted to the carriage would be reduced to approximately 5000 pounds.

In designing a gun carriage the first step is to obtain the velocity of the projectile in the bore. (See *Interior Ballistics* under BALLISTICS.) By multiplying this velocity by a factor equal to the weight of the projectile and part of the powder charge divided by the weight of the gun, the corresponding velocity of recoil of the gun is obtained, under the assumption that no resistance is used to check it. Increasing the velocity at the instant the projectile leaves the bore by an amount generally determined by experiments, and due to the fact that the powder acts on the face of the breech block for a short time after the projectile has left, we get the maximum velocity the gun would have were it free to move. This velocity is designated velocity of free recoil. The resistance due to sliding and stuffing-box frictions will reduce this velocity, as will also the force of counter recoil springs, or weights, used to return the gun into its firing position again. Calculating the amount that this will retard the gun and subtracting it from the velocity of free recoil, we are able to obtain the velocity of retarded recoil.

The length of recoil it is desired to give the gun on its carriage is next determined upon. This depends on various factors, such as the largest force that is permissible on the carriage without overturning and of course the limit of practical construction. To stop now the gun at this predetermined point use is made of the hydraulic cylinder, in which, by fastening the piston to the gun and the cylinder to the carriage, or vice versa, a liquid, generally oil, is forced through orifices of the piston. These orifices are generally made so that as the gun recoils they first increase in area from nothing and again decrease to nothing, so that the resistance of the oil to being forced through them may at all times be made constant, no matter what the velocity of the gun may be.

The size of the orifice is determined by using basic formulas for velocities and pressures and may be determined as follows:

Letting

V = the velocity of retarded recoil of the gun,
M = the mass of all recoiling parts,
F = constant piston-rod pull to stop the gun,
S = distance, in feet, the gun is to be permitted to recoil,

we have

$$\frac{MV^2}{2} = FS, \text{ or } F = \frac{SMV^2}{2} = \text{constant force}$$

to be exerted by the resistance of the oil to be forced through the orifices of the piston.

The law of flow of liquids is expressed by

$$v^2 = 2gh,$$

in which

v = velocity of flow,
g = 32.16,
h = height in feet of a column of liquid to produce this velocity of flow.

Knowing the weight of the throttling liquid used, we may substitute for h in the formula $v^2 = 2gh$ the weight of a column of liquid h feet high and 1 square inch in cross section that must be applied per square inch to move the liquid in any direction with the velocity v. A column of liquid h feet high and 1 square inch cross section weighs $h \times \frac{\delta}{144}$, in which δ is the weight of a cubic foot of liquid.

If A = area of piston and a = the area of the orifice in square inches at any point, we have $V_rA = va$, or $v = \frac{V_rA}{a}$; also

$$\frac{h \times \delta \times A}{144} = P$$

= total pull on piston rod, or

$$h = \frac{P \times 144}{\delta \times A}.$$

Substituting in $v^2 = 2gh$, we get

$$\frac{V_r^2A^2}{a^2} = \frac{P \times 144}{\delta \times A} \times 64.4,$$

from which

$$a^2 = \frac{V_r^2A^3 \times \delta}{144 \times P + 64.4},$$

or

$$a = \frac{V_rA}{12}\sqrt{\frac{A\delta}{P \times 64.4}},$$

in which a and A are in square inches and all terms known except a, the area of orifice, since V_r is the velocity at any instant of the recoil of the gun reduced from its maximum velocity by the constant pull P over the distance to the point considered.

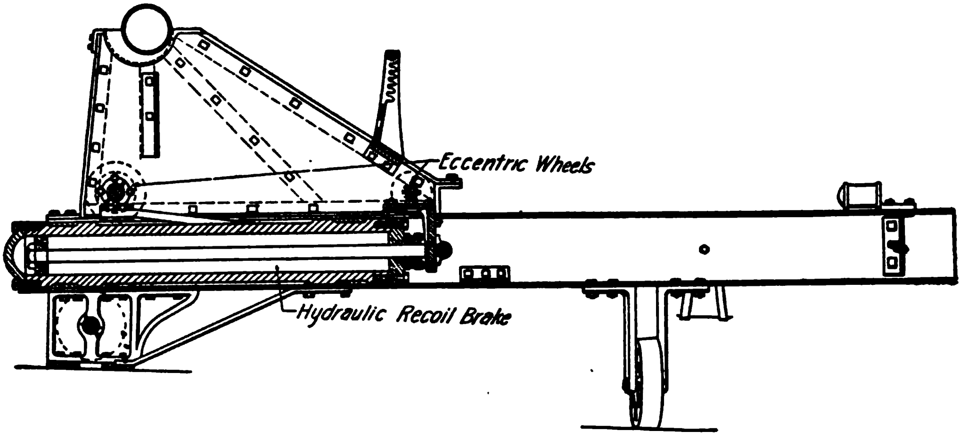
Prior to the adoption of the hydraulic brake various means of checking recoil were used. Up to about 1850 the friction of wooden wheels and axles was used with a rope for final stop. About 1860 naval carriages were made of iron and in place of rear wheels had a shoe (for friction). The front wheels helped in returning the gun to battery. On land heavy carriages had I-beam chassis and top carriages. Friction of top carriage on chassis rails as well as the inclination checked recoil. Eccentric axles allowed recoil on friction and return on rollers. As the power of guns increased recoil had to be further controlled. Between 1870 and 1880 various frictional devices were used. One or more bands of iron fastened to chassis were gripped by plates on top carriages pressed tightly on them.

The earliest hydraulic cylinders (about 1876) had pistons either pulled out or pushed in by recoil, the oil flowing around the piston in the clearance. Sir W. Siemens introduced holes in the piston head. So far, the orifice being constant, the pressure varied, running up to high values, then decreasing.

Top carriages now recoil on rollers to eliminate as much as possible the uncertain effect of sliding friction. Return to firing position is accomplished by gravity, springs, or pneumatic or air power. For giving elevation guns are generally rotated about their trunnions (at or near the centre of gravity) by a screw, rack and pinion, or similar device at the breech. In rapid-fire mounts the principle is the same, although elevation is generally given to a cradle or slide in which the gun's axis is fixed.

For traversing the early carriages were pried bodily sidewise by levers; then the chassis was pivoted and rotated by ropes and pulleys or later by gearing of one kind or another. Still later the chassis was fixed upon a turntable rotated by a pinion working in a circular rack in the foundation and operated by gearing.

In barbette carriages the gun is generally mounted on trunnions directly in the top carriage, which slides to the rear (restrained by a hydraulic brake) on the chassis rails. These incline upward slightly, to aid the springs to return the gun into battery again. The barbette carriage is used for seacoast or permanent defenses only. To protect it from the enemy's fire as much as possible parapets made of sand or concrete, or both, are thrown up in front of it. The carriage is made so that only the gun appears over this protection. This partly protects the men serving the gun, but will not protect the gun nor the man sighting it. To overcome this these guns were originally placed in casemates, made of stone and having openings through which the gun might be fired. Later turrets were made, in which heavy armor surrounded all sides and extended above gun, carriage, and crew. The most notable of these turrets were the Gruson turrets, of which many are used in fortified cities in Europe. With the advent of high-powered guns the use of casemates was at once abandoned. Much reliance, however, is still placed in turrets, and it was very generally believed that cities protected by the Gruson turrets were impregnable. The fallacy of this belief was shown by the fall, in the European War of 1914, of such

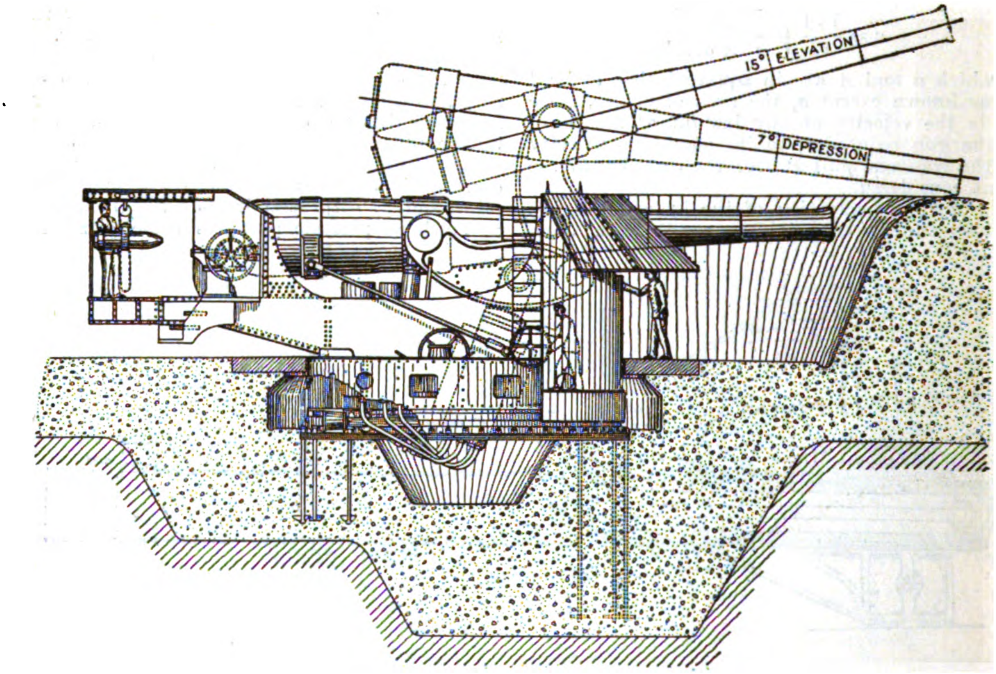


UNITED STATES IRON BARBETTE CARRIAGE FOR 8-INCH RIFLE.

Altered from carriage for 10-inch smoothbore, and used for the 8-inch converted muzzle-loading rifles. This carriage has eccentric wheels traveling on the chassis and a hydraulic recoil brake.

strongly fortified places as Liége, Antwerp, etc., before the powerful Krupp guns of the Germans.

It will undoubtedly be true that turrets will not be used in the future to any great extent except for battleships. They have, however, many ardent advocates, who claim that they should be used in seacoast defenses. Turrets carrying two 14-inch guns each are used in the defenses of Manila. The armor used is, of course, much heavier than was used in the Gruson turrets, being in some places 18 inches thick, the heaviest armor built up to date. The main advantage of the turret as compared with any other type of carriage protection is that the armor may be made to surround it entirely and that it may be used with equal protection in all-around fire.



13.5-INCH 68-TON B. L. RIFLE ON ELSWICK HYDRO-PNEUMATIC MOUNTING.

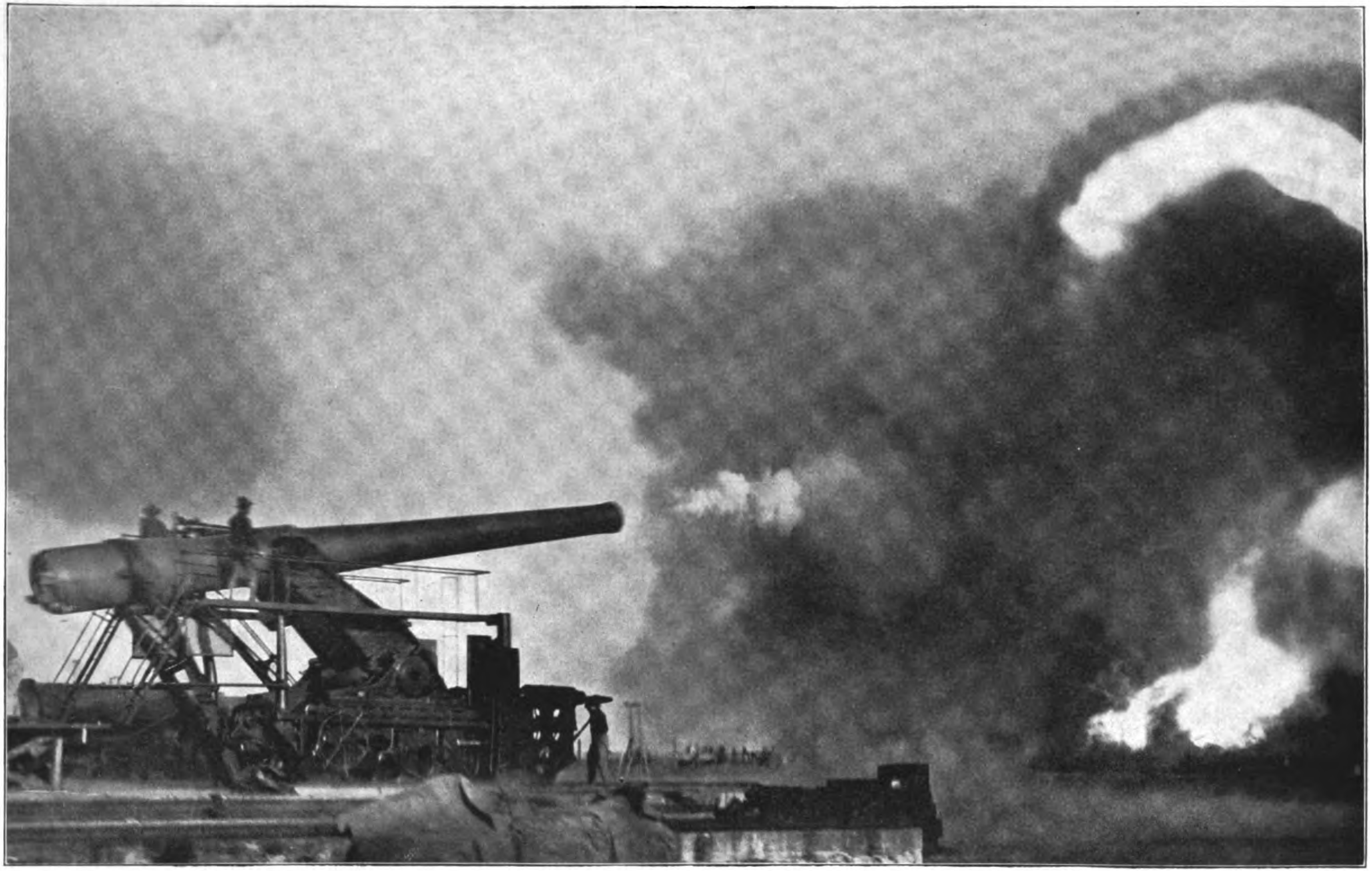
The only other carriage construction which gives protection to the gun, carriage, and crew is the disappearing carriage. It is used for seacoast defenses only. The most noted of this type is the one used by the United States. In this carriage (the Crozier-Buffington) the gun's trunnions rest in the upper ends of two levers which have an axle at their centres resting in a top carriage and pins at their lower ends supporting a counterweight in vertical guides. The motion of the gun's trunnions in recoil is a resultant of the horizontal motion of the gun lever's centre and the vertical motion of their lower ends, therefore an ellipse. The breech is held up at the proper height by a rod pivoted at bottom in a slide raised or lowered to change elevation. In recoil, therefore, the breech moves in a circular arc. The gun's muzzle moves to the rear almost horizontally until it clears the parapet, then sharply downward. In the loading position the breech (the most exposed part) is protected from fire over the parapet of less than 7° angle of fall. The motion of the top carriage is controlled by a constant-resistance hydraulic brake. The recoil is also somewhat absorbed by raising the counterweight, but this is incidental, as the counterweight's function is simply to return the gun to the firing position. Pawls catch on teeth on the counterweight crosshead, holding the gun in the recoiled position for loading until released by a lever. Entirely protected from the enemy's fire, the cannoneers load the gun and traverse and elevate by means of hand cranks or electric motors. These operations may be directed from a distance by telephone or by one man on the sighting platform—the only one exposed to fire—who, in the later models of carriages, can himself perform the training by electric controllers within reach. This carriage was invented in principle by Gen. A. R. Buffington in 1872, and developed into the present form, about 1890, by Gen. William Crozier, both of the Ordnance Department, United States army.

Another type of disappearing carriage is the English Elswick carriage, in which the gun levers have fixed pivots at their lower ends and are controlled in rotation by a rod from their centres carrying at its lower end the piston of the hydropneumatic cylinder, which by oil flow softens recoil and by air compression stores up energy to return the gun to the firing position.

Mortar Carriages. Mortar carriages have the turntable and chassis as in the preceding, but no top carriage. As they are for high-angle fire and recoil necessarily downward, springs are necessary for return to firing position. In the United States model of 1896 the mortar rests on the end of a lever pivoted at its bottom to the turntable and with spring columns and hydraulic buffer beneath. Previous to the adoption of such types as these, mortar carriages had been simple iron boxes with trunnion beds. See Plates of ARTILLERY and COAST DEFENSE.

Rapid-Fire Mounts. Rapid-fire mounts are,

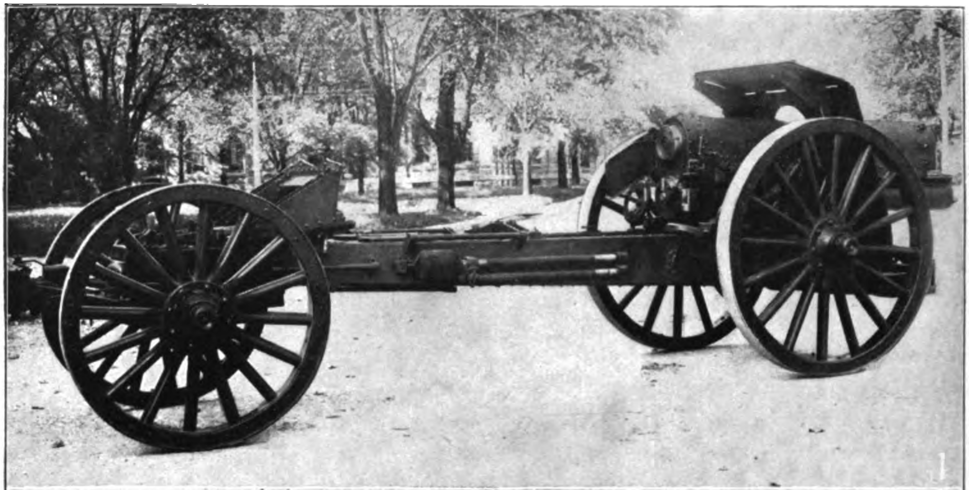
ORDNANCE

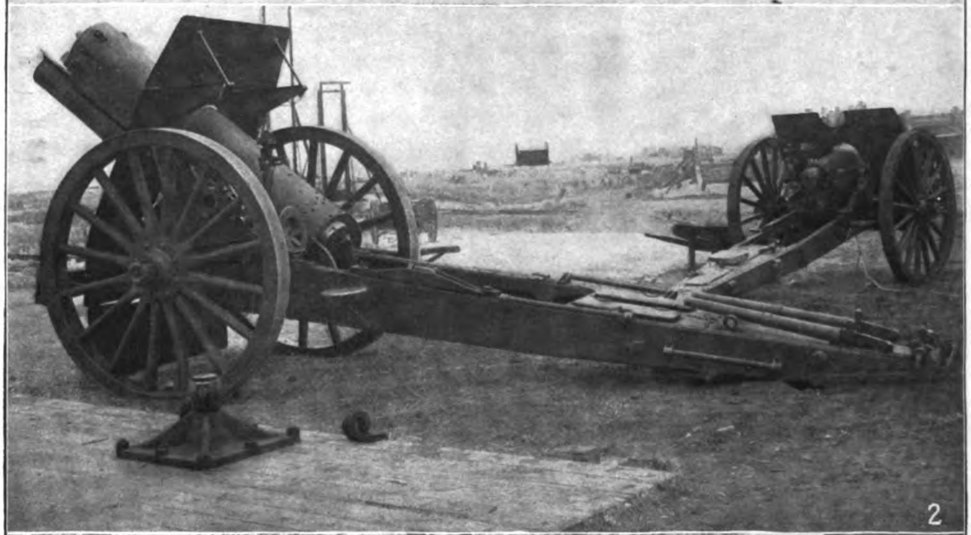


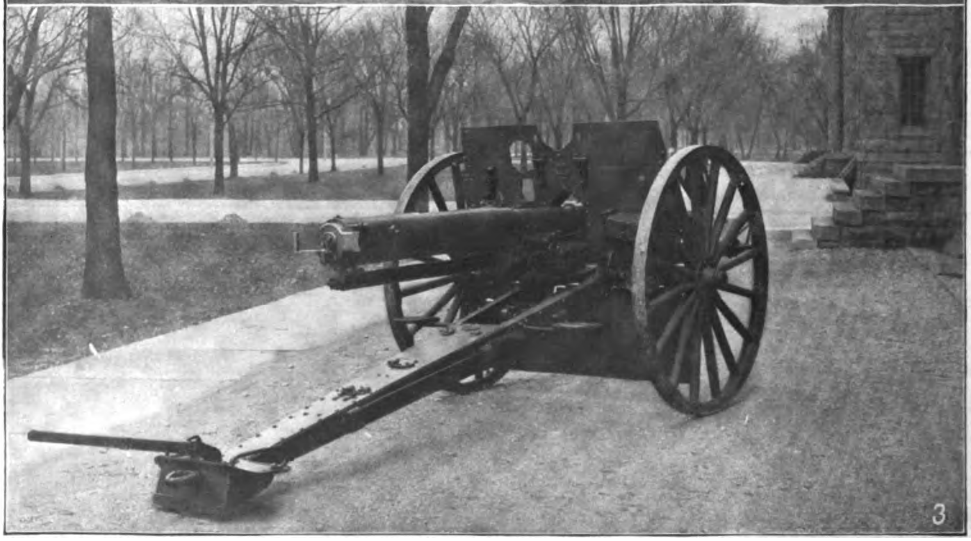
A 14-INCH BREECH-LOADING RIFLE ON DISAPPEARING CARRIAGE

Gun has just been fired and is recoiling to its loading position

ORDNANCE







1. UNITED STATES ARMY 6-INCH HEAVY HOWITZER (PROJECTILE, 120 POUNDS)
2. UNITED STATES ARMY 6-INCH HOWITZER (LEFT) AND 4.7 INCH HOWITZER (RIGHT)
3. UNITED STATES ARMY 3-INCH FIELD GUN IN RECOILED POSITION

as the name implies, used for rapid-fire guns. They were generally used for small-calibre guns, such as one-pounders or two-pounders. Their use is now generally limited to seacoast defenses for repelling landing parties. They are generally of the nonrecoil type and are arranged for quick or automatic loading. For larger calibres the term "rapid-fire gun" is not now used. Training is done in these small-calibred guns by a shoulder bar with rubber cushion, fastened in nonrecoil mounts to the gun or yoke, in recoil mounts to the yoke or cradle. With his shoulder against the bar the gunner points the gun in direction and in elevation almost as a small arm.

Mobile Carriages. Carriages for field and siege guns and howitzers differ in detail and size, while the same in principle. A carriage must have two wheels with axletree and a trail giving a third point of support on the ground when firing, and mobile carriages have for centuries been constructed accordingly. Until the American Civil War all mobile carriages were made mostly of wood, although with metal bracings, axletrees, and other parts. At this time iron was recognized as the coming material and was soon adopted. Since 1880 all carriages have been made of iron or steel. With the exception of parts of the wheel they are now made of high-grade steel.

The most important qualification of a mobile artillery gun and carriage of to-day is that in addition to its power it must possess great mobility and be able to fire rapidly. To insure mobility the gun and its carriage must be as light as possible consistently with required strength. To insure rapidity of fire it is not as essential that it must be able to fire continuously as it is that it must be able to fire without deranging the aim. It has been the aim of designers of field artillery to meet these requirements. The carriage of the American Civil War was practically the same as that used in the Revolutionary War. They also were the same as those used in Europe. The gun trunnions were rigidly connected to the flasks of the carriage, and on firing the gun the carriage was forced to the rear until the energy was spent in moving it.

CALIBRE AND MAKE	M. V. f. s.	Weight projectile lbs.	Range yds. (on carriage)	Transportation	Weight gun, carr. and wagon combined	Weight of max. load, lbs.	Elevation limits, degrees	Traverse total
French								
8.3″ How.	......	......	......	......	17,100			
Schneider	1,100	216	9,400	2 vehicles	15,000	8,060	0/43	6°
9.5″ do.	900	309	7,000	2 vehicles	15,700	8,500	10/60	6°
11″ do.	1,050	606	9,100	5 vehicles	52,300	11,200	20/60	20°
German								
8.3″ Krupp	1,150	275	9,880	2 vehicles	16,200	8,100	20/60	10° 4°
9.5″ do.	1,130	420	10,170	2 vehicles	23,200	11,700	20/60	4° 10°
11″ do.	1,115	750	11,050	2 vehicles	42,500 37,200	19,900	20/65	4° 10°
8.3″ Ehrhardt	1,120	308	10,200	2 vehicles	19,500	10,100	−5/65	6°
	1,312	485	10,830					
11″ do.	984	672	8,260	2 vehicles	27,200	14,100	20/60	10°
	885	761	7,050	......	......	......	......	30°
8.3″ German	984	262	8,750	2 vehicles	14,700	7,010	−6/70	
9.5″ Austrian	846	293	7,100	2 vehicles	20,500	10,282	4/65	
10.6″ French	951	330	5,700	4 vehicles	49,043	12,570	−10/70	24°/30°
9″ Russian	787	306	8,100	2 vehicles	14,570	12,570	0/65	
11″ Japan	1,460	480	8,570	Semifixed				
12″ Austrian	......	850	......	3 vehicles				
16.5″ Krupp	......	2,100	15,300	Rail	......	......	40+	Not adopted
23.5″ do.	......	2,650	......	Rail	......	......	40+	as a standard

Credit is probably due to France for developing a field-gun carriage which has served as a form to be adopted in all other countries. What is the more remarkable about it is that this gun and carriage, which bears the model 1897, and which is the pioneer, is the famous 75-millimeter gun which did such wonderful work in the European War of 1914. In this carriage spades fixed to the end of the trail tend to prevent movement to the rear. The wheels are locked so as to act as brakes in case movement takes place. The gun is allowed a recoil on its carriage, thereby reducing the shock of discharge. A traverse of the trail is allowed on its axle, so that the gun may be pointed within limits of 8° without moving the carriage. The gun is returned into battery by means of counter recoil springs aided by compressed air.

The United States gun and carriage to correspond to this French gun is the 3-inch field gun, model of 1902. This is a design of the United States Ordnance Department, embodying features found in the French, Ehrhardt, and Krupp guns. It is permitted a recoil of 48 inches on its carriage, and the cradle on which the gun slides in recoil may be traversed 6° without moving the carriage.

When the hydraulic-recoil field carriage was perfected it might well have been assumed that additional improvements would not be required. This has proved not to be the case, however, and it is probable that at the close of the European War great changes will be necessary in field artillery for all nations. The main reason for this is probably the advent of the aëroplane, to fire against which it is necessary to elevate the gun to high elevations, and in order to keep the number of different guns at the minimum it is desirable that the field gun should be able to do this in addition to its qualification for firing against land targets. Another reason is that with the improvement in fire-control equipment and range finders artillery fire at long ranges is a common occurrence, and for that reason elevations over 15°, which elevation heretofore has generally been the limit, must be exceeded, and carriages in which elevations for the maximum possible range, approximately 43°, can be obtained, will be necessary.

To meet these requirements is the object of the latest improvement in field artillery, in what is known as the split-trail carriage, the original idea of which again belongs to Colonel Deport, of France, who perfected the model of 1897 75-millimeter French gun. With this construction the trail, instead of being formed in one piece, is made of two parts hinged to the axle and arranged by means of a universal joint so that the flask may be separated. In order to insure additional stability to the carriage, spades are driven into the ground before firing, thereby insuring that no movement even for the first shot takes place. A much larger traverse of the gun on its carriage is obtained by means of this construction, amounting in the Deport carriage to 45°. A number of split-trail carriages of different designs, but all on the same principle, are being manufactured by various ordnance establishments. The United States has adopted the type for future manufacture.

The limit of size of gun that can be transported with a field army and that is needed in a modern war has long been the subject of discussion. France, for a long time, contended that she did not need guns larger than the 75-millimeter (2.95-inch), and provided nothing larger except a few 4.7-inch howitzers, for which no regular organization was provided. Germany, on the other hand, went ahead and provided large-calibre siege guns, and constructed them so that they can be manœuvred with ease. The soundness of her judgment may be realized by the results in the European War, where the possession of large guns gave to Germany such tremendous advantage at the beginning of the war as to make it fair to assume that every country will be forced to increase her percentage of heavy guns.

Some of the large-calibre siege guns as used in the European War are listed in the tabulation shown on page 537.

See ARTILLERY; COAST ARTILLERY; COAST DEFENSE; FIELD ARTILLERY; FORTIFICATION; GUNS, NAVAL; HOWITZER; MACHINE GUN; MORTAR; SIEGE GUN; SMALL ARMS; and similar topics; and the bibliography under these titles.

Bibliography. Lloyd and Hadcock, *Artillery: Its Progress and Present Position* (Portsmouth, Eng., 1893); O. M. Lissak, *Ordnance and Gunnery* (New York, 1907); United States Naval Academy, *Textbook on Ordnance and Gunnery* (Annapolis, 1910); H. A. Bethell, *Modern Guns and Gunnery* (Woolwich, 1910); id., *Modern Artillery in the Field* (New York, 1911); also official publications of United States army, Ordnance Department, *Journal of the United States Artillery* (Fort Monroe, Va.), *Field Artillery Journal* (Washington, D. C.), and other papers of the American and European service.

ORDNANCE DEPARTMENT OF THE UNITED STATES ARMY. One of the divisions of the United States army, to which is assigned the duty of procuring by purchase or manufacture the ordnance and ordnance supplies required by the army and distributing the same. Accordingly the establishment and maintenance of arsenals, armories, and depots for the manufacture and storage of ordnance are assigned to this department. The regulations define ordnance and ordnance stores as including cannon and artillery carriages and equipments; apparatus and machines for the service and manœuvre of artillery; small arms, ammunition, and accoutrements; horse equipments and harness for the artillery; tools, machinery, and materials for the ordnance service. This department is under a chief of ordnance, who has the rank of brigadier general while serving in this capacity, and in 1915 there were 6 colonels, 9 lieutenant colonels, 19 majors, 25 captains, 25 first lieutenants, and 745 enlisted men. Previous to the Army Bill of 1901 the officers in the Ordnance Department held permanent commissions in the Ordnance Department, but this Act provided that line officers should be detailed to the Ordnance Department by the President for a period of four years. Officers below the detailed rank of major must serve one year with the line troops in which they hold commissions before they are again eligible for detail. Majors and above may be redetailed without this year in the line. With this system the officers are able to understand the needs of the line better, and use their practical experience to great advantage in their work as ordnance officers. Before an officer can be assigned to the Ordnance Department he must first pass a rigorous examination in which his professional qualifications are thoroughly tested. If successful in this examination he may be detailed with the rank and pay of the grade next above the one he holds in the line. The officers, in addition to a thorough scientific military training, must possess a thorough knowledge of mechanical engineering in general and especially in its application to the various engines of war. This department has always maintained a high standard and many important inventions have been made by its members. In fact, the larger and more important guns constructed in the United States have been designed and constructed by the officers of this department at army arsenals instead of at the shops of private corporations, as is the case in most European countries. See ORDNANCE; ORDNANCE ESTABLISHMENTS.

ORDNANCE ESTABLISHMENTS. The United States maintains two government gun factories, one at Watervliet, N. Y., for the army, and one at the Navy Yard, Washington, D. C., for the naval guns. Carriages for naval guns are made at Washington Navy Yard, and those for the army at the Watertown Arsenal, Watertown, Mass., and Rock Island (Ill.) Arsenal. Small arms for the army and navy are made at the army armory at Springfield, Mass., and ammunition therefor at Frankford Arsenal, near Philadelphia, Pa. The last-mentioned arsenal makes also all fuses, primers, sights, etc. Rock Island Arsenal, above mentioned, makes, in addition to mobile gun carriages, harness and other equipments used in the army. Shop facilities are also available for the manufacture of small arms. Material of war is fired and tested at the proving grounds at Sandy Hook, N. J. (army), and Indian Head, Md. (navy). There are various ordnance repositories, arsenals, armories, etc. (See ARSENAL.) Heavy gun carriages have been made for the United States by the Bethlehem and Midvale Steel companies, which firms also supply steel forgings for cannon. Bethlehem has also made 8-inch, 10-inch, and 12-inch modern built-up cannon. Other American firms also have made heavy gun carriages, 12-inch mortars, and smaller guns, projectiles, etc. Explosives are furnished principally by the Du Pont Powder Company. These and other private establishments supplied munitions of war to European governments during the War of 1914. Revolvers, machine guns, etc., are furnished principally by Colt Patent Firearm Manufacturing Company, which manufactures these articles in accordance with its own designs or else according to models furnished them. Machine guns are manufactured in large number by the Colt Company. Machine guns are also made at the Springfield armory. In Europe the principal government ordnance factories are at Woolwich Arsenal (England), Bourges and Puteaux (France), Turin and Naples (Italy), Alexandrovsk and Aboukhoff (Russia), Seville and Trubia (Spain). European nations depend principally for ordnance on private manufacturers, of which the most prominent are: Friedrich Krupp, at Essen, Germany; Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-upon-Tyne, England, and Italy; Vickers Sons and Maxim Company, Ltd., England; Schneider et Cie, Le Creusot and Saint-Chamond, France; Hotchkiss et Cie, Saint-Denis, France; and the Skodawerke, Pilsen, Austria. Proving grounds are located at Havre and Harfleur, France; Spezia, Italy; and Essen, Germany.

ORDÓNEZ DE MONTALVO, ôr-dō′nâth dā môn-tăl′vô, Garcí. A Spanish author, who flourished in the latter part of the fifteenth century. There is uncertainty even about his name. As here given it appears in many of the early *Amadis* editions (e.g., Seville, 1511). But the author was also known as Garcí Rodríguez de Montalvo, and his *Sergas de Esplandián* (Rome, 1525) gives the name as Garcí Gutiérrez de Montalvo. To him is due the first Spanish version now extant of the famous romance of *Amadis*. Utilizing the material of previous writers, he prepared his version after 1492 (unauthenticated edition, Seville, 1496; first authenticated edition, Saragossa, 1508). The greater part of his work may have been mere translation from the Portuguese, but he also added much matter of his own in the first three books, and the fourth book is probably entirely his. In his own composition, the *Sergas de Esplandián*, he tells of Amadis' son. We know of Montalvo only that he was Governor of the city of Medina del Campo. Both the *Amadis* and the *Sergas de Esplandián* are published in vol. xl of the *Biblioteca de autores españoles*. Consult: Baist on the Spanish *Amadis* and K. M. de Vasconcellos on the Portuguese *Amadis* in their articles on Spanish and Portuguese literature in Groeber, *Grundriss der romanischen Philologie*, vol. ii (Strassburg, 1900); G. S. Williams, "The Amadis Question," in *Revue Hispanique*, vol. xxi (Paris, 1909); H. Thomas, *The Romance of Amadis of Gaul* (London, 1912).

ORDONNANCE DE LA MARINE, ôr′dō′näɴs′ de lȧ mȧ′rēn′. A naval code of admiralty law, in five books, issued by Louis XIV of France, at Fontainebleau, in August, 1681. Book i deals with the organization of admiralty jurisprudence; book ii with the contractual relations between masters and seamen; book iii with the entire subject of marine contracts, covering such topics as charter party, affreightment, insurance, average, jettison, etc., also privateering and letters of marque and reprisal; book iv with the administration of the customs; book v with fisheries. Consult *Ordonnance de Louis XIV . . . touchant la marine* (Paris, 1681).

ORDONNEAU, ôr′dō′nō′, Maurice (1854–). A French dramatist and librettist of comic operas, of which the most popular was *La poupée* (1896), music by Audran (q.v.). His translation of Brandon Thomas's farce, *Charley's Aunt*, which he called *La marraine de Charley* (1894), had a tremendous vogue. Ordonneau was educated at the lycée of Versailles and became a Knight of the Legion of Honor and a member of the important commission of authors and dramatists. Besides serving as dramatic critic for *Le Gaulois*, *Le Matin*, and *Libre Parole*, he wrote the following plays: *L'Heure du berger* (1883); *Durand et Durand* (1887); *La plantation Thomassin* (1891); *Les Boulinard* (1891); *Une affaire scandaleuse* (1901); and these comic operas: *La princesse Colombine* (1886); *La cocarde tricolore* (1892); *La perle du Cantal* (1895); *L'Auberge du tohu-bohu* (1897); *Le jockey malgré lui* (1901); *Les hirondelles* (1907); *Helda* (1911).

ORDOVICIAN, ôr′dô-vĭsh′an (from Lat. *Ordovices*, name of an ancient British tribe of North Wales), or Lower Silurian System. A division of geologic time following the Cambrian and preceding the Upper Silurian or Silurian proper. The Ordovician comprises rocks originally classed by Murchison as the lower portion of his Silurian system. It was considered to be of sufficient importance to be classed as a separate division by Lapworth in 1879, who proposed for it the term Ordovician. The type section of the American Ordovician is found in New York State, and consequently the names of many of the subdivisions are locality terms used in New York. It is as follows:

Ordovician	Upper	Richmond Lorraine Utica
	Middle	Trenton Black River Lowville
	Lower	Chazy Beekmantown

The Ordovician rocks are chiefly limestones, with the exception of the upper and lower members, which may be very shaly. The so-called Hudson River shales, which are the unclassified equivalents of the upper formations, form a very prominent series of rocks in the Appalachian States. The Trenton rocks are widely distributed over the continent. The Ordovician strata are often found fringing the Archean areas, being sometimes separated from them by but a thin strip of Cambrian. Thus, there are belts of Ordovician rocks around the New York Adirondacks; from central New York westward to Wisconsin and Minnesota; along the line of the Appalachians on the eastern and sometimes on the western slope from Vermont to Alabama; around the V-shaped Archean or Laurentian of Canada; and in the Central States, in Ohio, Kentucky, Indiana, and Tennessee. Ordovician rocks are also known in the Uinta, Wasatch, and Rocky mountains. In Europe the Ordovician rocks form a large area extending from Iceland into Russia. They are of considerable thickness in Great Britain and Wales. Additional areas are found in Bohemia, Germany, France, Portugal, Spain, and northern Africa.

In neither North America nor Europe do we find any marked break between the Cambrian and Ordovician systems, but the faunal changes are well shown. During the Ordovician times a great interior sea existed in the United States, and the coastal States were also under water, but in the southwest much dry land was known. At the close of the Ordovician there were great disturbances. The mountains along the New York-New England border were formed and gave rise to the so-called Taconic ranges and the Green Mountains. Much faulting and folding accompanied the uplift. There was also developed a line of uplift in Ohio, Kentucky, and Tennessee, which domed the rocks up into a low, broad anticline known as the Cincinnati arch.

The life of the Ordovician, while being in advance of the Cambrian time, was not of a high order. Many seaweeds have been found, and cryptogams probably existed, though only scanty remains have been preserved. Being land plants, their preservation would be doubtful in marine sediments. Foraminifera and Radiolaria were abundant, as were also the sponges. In the Hudson River slates graptolites were very common. Among the corals were many representatives of the Tetracoralla, and also large cup corals like Streptelasma, while *Columnaria* was a common compound one. Cystidean crinoids are numerous, and many starfishes and even sea urchins are known. The trilobites were very well developed, but the genera were largely different from those of Cambrian age. The brachiopods were represented by many well-known genera, especially *Orthis*, and many groups of Mollusca existed. *Pleurotomaria* among the gastropods and *Orthoceras* among the cephalopods were numerous. Fishes were the only representatives of the vertebrates, and of these were found armored ostracoderms in the Ordovician sandstones of Colorado. Fish teeth are known in the European Ordovician.

Among the useful minerals of the Ordovician are great quantities of building stone, including limestone, slate, and marble. In Ohio and Indiana supplies of petroleum (q.v.) and natural gas occur in the rocks of the Cincinnati arch. Zinc and lead ores are mined in southeastern Missouri and the Upper Mississippi valley in Wisconsin, Iowa, and Illinois. Along the contact between the Cambrian and Silurian in rocks in many parts of the Appalachians are found deposits of limonite ores, some of which are mined.

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ORDUIN-NASHCHOKIN, ôr′dụ-ên-năsh-chŏ′kĭn, ATHANASY LAVRENTEVICH (?–1680). A Russian statesman. He was employed in determining the new Russo-Swedish boundary in 1642, held an important command during the Swedish War, and conducted the peace negotiations with the Swedes in 1657. In 1664 he participated in the abortive peace negotiations between Russia and Poland. Three years later he was created a boyar of the first class and was made Minister of Foreign Affairs and Keeper of the Great Seal. In consideration of his responsibilities he may be regarded as the first Russian Chancellor or Prime Minister. He was dismissed in 1671, and thereafter lived in a monastery near Kiev. Orduin was one of the earliest Russian statesmen to realize the importance of the Baltic seaboard.

ORD′WAY, JOHN MORSE (1823–1909). An American chemist and educator. He was born at Amesbury, Mass., and graduated from Dartmouth College in 1844. He was a member of the faculty of Grand River College, Trenton, Mo., from 1850 to 1857, and thereafter held superintendencies in a chemical factory at Johnston, R. I., and in a print works in Manchester, N. H. After several years as consulting chemist Ordway, in 1869, became professor of metallurgy and industrial chemistry in the Massachusetts Institute of Technology. In 1884 he was appointed professor of applied chemistry in Tulane University, New Orleans, where he reorganized the biological department and in 1891 became head of the department of engineering. His original work includes valuable researches on lubricating oils and on nonconducting coverings for steam pipes.

ORE (AS. *ār*, *ær*, ore, brass, copper, bronze, Goth. *ais*, OHG. *ēr*, brass; connected with Lat. *æs*, copper ore, bronze, Skt. *ayas*, metal). A rock mass containing one or more metals in sufficient quantity and purity to warrant its exploitation. An ore may contain metal in the native state, as most gold ores, or the metal may be chemically combined with other elements, as is illustrated by iron ores and most of the other commercial ores. See ORE DEPOSITS.

ÖREBRO, ẽ′re-brō. A seaport of Sweden, situated at the entrance of the Svartå-Elf into the Hjelmar Lake, 135 miles west of Stockholm (Map: Sweden, E 7). Part of the town is built on an island in the river and contains the old castle, now a museum. The church and the town hall are the most notable buildings. The town has manufactures of machinery, tobacco, matches, and chemicals. These industrial products, together with the minerals obtained from the neighboring silver, copper, and iron mines, are conveyed to Göteborg and Stockholm by means of the extensive system of canals which connects the lakes of the interior with the maritime ports. Pop., 1890, 14,547; 1900, 22,013; 1910, 30,082. At the Diet of Orebro, held in 1529, Lutheranism was established as the state religion of Sweden. More than 20 historic diets have been held in this city.

ORE DEPOSITS. The name applied to natural concentrations as accumulations of metalliferous minerals found in the earth's crust. The term "ore" includes those portions of the deposit which contain the metallic minerals in the proper quantity and combination to make their extraction possible and profitable. According to this definition a metalliferous rock may not be a commercial ore to-day, but improvement in methods of treatment, resulting in decreased cost, may make it so later. The metalliferous minerals are the ore minerals. Associated with these there are often minerals of a nonmetallic or even metallic character, containing little or no metal, which are termed the gangue. The metallic mineral of the ore is sometimes in the native or metallic form, but more commonly it is an oxide, sulphide, sulphate, carbonate, silicate, or some other salt of the metallic element. A deposit may contain the ores of one or several metals and there may also be several compounds of the same metal in any one deposit. Gold and platinum are usually found in the native condition, while copper, lead, and zinc commonly exist as sulphides and iron as oxides. The common gangue minerals are quartz, calcite, barite, dolomite, fluorite, hornblende, feldspar, etc. They may sometimes be so evenly mixed with the metallic minerals that it is necessary to crush the ore and separate the two by mechanical or magnetic methods, while at other times the gangue forms horses which can be easily separated or avoided in mining. Ore deposits vary greatly in form, size, and geological position as well as in their mode of origin.

Origin. The fact that the deposits occur as masses of greater or less concentration may be explained in two ways: that they have been formed contemporaneously with the inclosing rock (syngenetic deposits) or that they have been formed by a process of concentration at a later date (epigenetic deposits). The former theory involves a consideration of ore occurrences in both igneous and sedimentary rocks. In igneous rocks the metallic minerals may not only be among the first to crystallize out, but this may be accompanied by a segregation of the grains to form an ore body. If the ores of sedimentary rocks were of contemporaneous origin, then the deposit must be a bedded one, conforming to the strata of the rock; the metallic minerals may have been held in solution from which they were deposited by evaporation of the solvent or by some chemical reaction, or they may have been held simply in suspension and accumulated by gravitational processes. Although the quantity of metallic elements found in the waters of the ocean is extremely small, there are not a few examples of such bedded deposits. On the whole, the greater number of ore bodies are of epigenetic character. Demonstration of this involves proving: (1) the existence of metallic elements in the rocks, (2) some transporting agent, and (3) conditions favorable for precipitation. That metallic minerals are widely distributed, although in small quantities, in both igneous and sedimentary rocks, has been shown by careful analysis of many rocks, but the quantity found in igneous rocks is slightly greater than that occurring in sediments. Since, however, the sediments were originally derived from the igneous rocks, it follows that the latter must be the original source of the minerals. Water is assumed to be the transporting agent, for it is known to be widely distributed in the rocks of the earth's crust. It may be of surface origin or it may be magmatic water expelled from igneous rocks during the process of cooling. This type of water is now regarded as the more important. The solvent power of the water is shown by the fact that many spring and mine waters have metallic elements in solution, including gold, silver, copper, zinc, lead, and mercury. Indeed, some of these metals are actually being deposited by some hot springs at the present day; Weed has described a spring in Montana which carries gold and has deposited its burden of auriferous quartz on the plants near its mouth. Most ore deposits are closely associated with igneous rocks and in some cases with hot springs, and the former have perhaps served to open the way for heated waters and vapors whose solvent power is much greater than that of cold water. The advocates of the meteoric circulation theory believe that the waters have circulated through the rocks, taking the metallic compounds in solution and redepositing them later. Those who consider the presence of igneous rocks to be an important factor in ore deposition also believe that the minerals may in some cases have been brought from a great depth in solution in the waters given off by the igneous magma, but that in some instances the igneous intrusion itself may have been the source of the minerals.

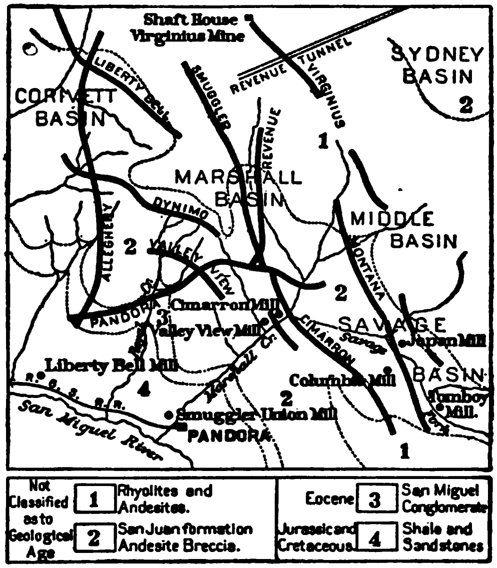


FIG. 1. GEOLOGICAL SKETCH MAP OF THE TELLURIDE DISTRICT, COLORADO, SHOWING VEINS STRIKING IN DIFFERENT DIRECTIONS.

While all minerals are slightly soluble in cold water, this solvent power may be greatly increased by heat, pressure, and the presence of alkaline salts or other compounds. The metals may thus be leached out of the rock at some depth and out of contact with the air. When the solutions approach the surface or enter a cavity, the load of dissolved minerals is deposited either wholly or in part, as a consequence of cooling of the ore-bearing solution, decrease in pressure, and in some cases of the oxidizing effect of the atmosphere, which converts certain soluble salts into an insoluble form. Iron compounds, e.g., may go into solution in the form of carbonate, but on exposure to the air the latter is rapidly changed to limonite, the hydrous oxide, which is insoluble. The precipitation of the ore and gangue minerals may take place in cavities, in which case the ore often shows a banded or crustified structure, due to deposition of one layer on another. These cavities may be due to faulting, jointing, shrinkage, brecciation, solution, etc. The experiments of Van Hise and later Adams have shown that cavities may exist in rocks to a depth of probably 11 miles, when the pressure is sufficient to close them. Where no cavities exist the ore may be deposited by replacement or metasomatism. In this process the minerals of the original are slowly dissolved out and the ore mineral deposited in its place. Large ore bodies may be formed in this manner. The magmatic waters when expelled from igneous rocks at depth are under high temperature and pressure and must be in vaporous form. Gases are probably mixed with them. As they move farther from the igneous rock towards the surface where pressure and temperature are less, the water assumes the liquid form. The gaseous condition is termed pneumatolytic, and some ores are deposited under it close to the intrusive, while others may be precipitated farther away under less temperature and pressure. Since certain conditions are favorable to the formation of certain minerals, we can tell from the mineral composition of a deposit whether it was formed in deep, intermediate, or shallow zones.

Form. Ore deposits vary greatly in their form, and this character has sometimes been used as the basis of classification. Certain forms are so numerous as to deserve special mention.

Veins are ore bodies of tabular shape resulting from the filling of a fissure or replacement along its walls. A filled fissure shows a banded structure due to the deposition of successive layers on the walls of the cavity. These layers or bands may represent different ore minerals or consist of alternating layers of ore and gangue. Replacement fissure veins have indefinite boundaries. If the vein is inclined the lower wall is spoken of as the footwall, and the upper one as the hanging wall. Veins often split, narrow (pinch), or widen (swell), and change their direction. In passing through hard, massive rocks like quartzite the vein fissure is apt to be clean-cut, but where the fissure passes through soft rock like shale or some dikes it may split up into a number of small stringers. A parallel series of closely spaced veins is termed a *lode*. Veins may often intersect, and of two which cross each other one may be of a later date and follow a fault plane which has broken and displaced the earlier one. The ore in such cases is apt to be much richer at the point of intersection. Even in a single vein the ore may follow certain streaks which are termed *chutes*, or again it may be restricted to pockets of great richness, which are known as *bonanzas*. Of the different gangue minerals found in veins quartz is the commonest; in some regions, as California, quartz veins are extremely abundant and often carry considerable gold. Since the quartz is commonly resistant to the weather, the wall rocks may often decompose and wash away, leaving the outcrop of the vein extending as a ledge or ridge along the surface. Veins vary in width from a few inches to several hundred feet, and their outcrop (q.v.) is sometimes traceable for a long distance. *Gash veins* are a special type of local extent, formed by the enlargement of joint fissures.

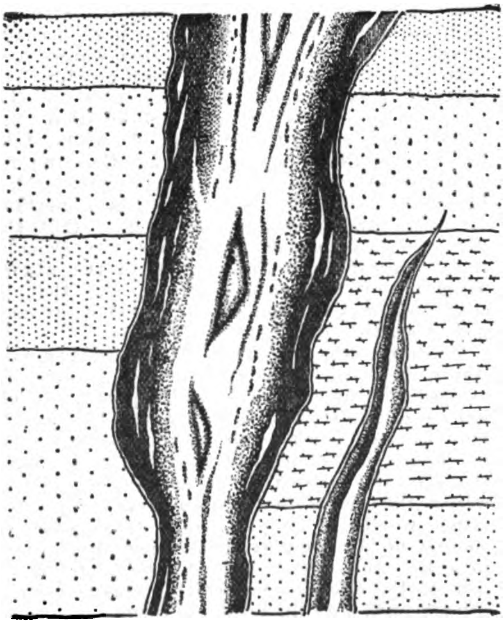


FIG. 2. QUARTZ VEIN.

The white vein material is quartz. The dark is blend and rhodochrosite.

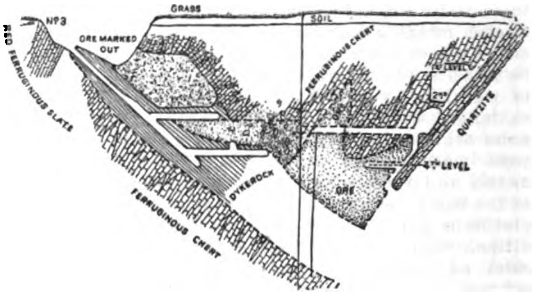


FIG. 3. CROSS SECTION OF COLBY MINE, PENOKEE-GOGEBIC DISTRICT, MICHIGAN.

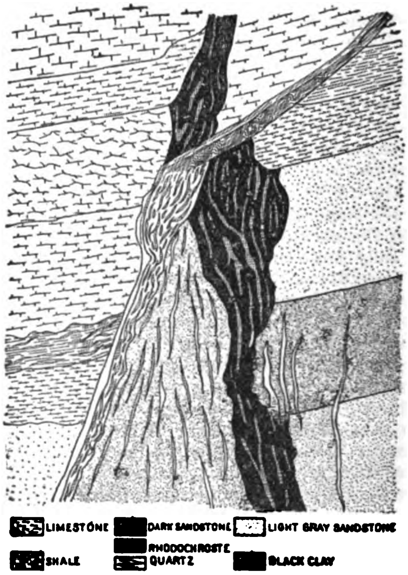
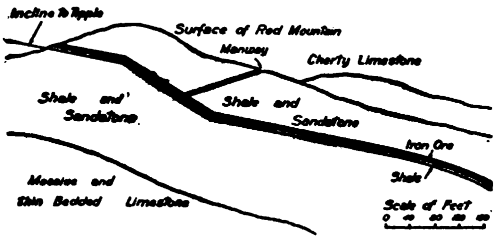


FIG. 4. THE JUMBO VEIN FAULTED BY A CROSS VEIN.

Chimney is a term applied to ore bodies which are rudely circular or elliptical in horizontal cross section but may have great vertical extent. A *stock* is a somewhat similarly shaped ore body, but of greater irregularity of outline. *Fahlband* is a term applied to sparse disseminations following certain lines along the strike of a schist. *Stockworks* are irregular fractures which have been mineralized. *Impregnation* indicates the occurrence of minerals in a finely disseminated condition in rocks. *Contact metamorphic* deposits are those found in some rocks, especially limestones, adjacent to an intrusive. The ores and gangue minerals have been largely if not wholly derived from the igneous rock.

Placer deposits include a series of gravel deposits of sedimentary origin. These are widely distributed, especially in the Western States, and are a common source of gold, platinum, and sometimes tin.

Weathering. Most ore deposits have been changed superficially by weathering, the depth of this alteration varying from a few feet to several hundred; in the Rocky Mountains 300 to 400 feet is not uncommon and 2000 feet is extreme. Where the ore body contains iron-bearing minerals the oxidation of these may stain it heavily with limonite, and to this the name of *gossan* is often applied. The compounds in the weathered zone include oxides, carbonates, chlorides, sulphates, silicates, and native metals. At some localities the leaching out of the other minerals has naturally resulted in the concentration of the iron contents, so that the gossan can be worked as an ore of the latter mineral, while below the zone of weathering the deposit supplies a different type of ore, viz., that which originally predominated in it. The changes caused by weathering are both physical and chemical, or the same as would occur in all rocks, the difference being that the metallic minerals are more easily affected. The physical changes involve a disintegration of the mass. The chemical effects include processes of oxidation, hydration, and solution. Many of the sulphates produced by weathering are soluble and carried downward in solution into the unweathered or sulphide zone. There by reaction with other sulphides the sulphates are reduced to sulphides and precipitated. This results in what is known as secondary enrichment. It is a well-known fact that many primary ores are too poor to work, but have been rendered commercially valuable by secondary enrichment. An ore body may thus be divisible into three zones, viz.: (1) zone of weathering, (2) secondary enrichment zone, (3) primary ore. The zone of weathering often shows: (*a*) an upper zone of complete oxidation, (*b*) a zone of leaching, (*c*) a zone of oxide enrichment. The following reactions indicate the type of changes that may go on in the weathering and secondary enrichment zones.



BEDDED DEPOSIT OF IRON ORE, BIRMINGHAM, ALA.

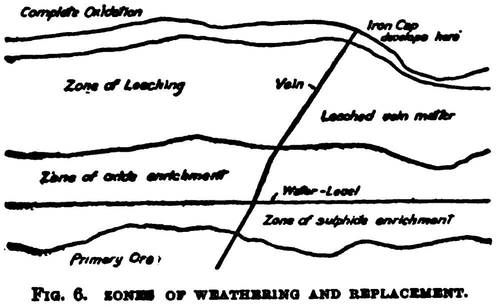


FIG. 6. ZONES OF WEATHERING AND REPLACEMENT.

$$\text{Weathering zone}\begin{cases} FeS_2 + 7O + H_2O = FeSO_4 + H_2SO_4 \\ 6FeSO_4 + 3O + 3H_2O = 2Fe_2(SO_4)_3 + 2Fe(OH)_3 \\ 4Fe(OH)_3 = 2Fe_2O_3 \cdot 3H_2O + 3H_2O \\ CuFeS_2 + 8O = FeSO_4 + CuSO_4 \end{cases}$$

$$\text{Second'y enrich't zone}\begin{cases} 14CuSO_4 + 5FeS_2 + 12H_2O \\ \qquad = 7Cu_2S + 5FeSO_4 + 12H_2SO_4 \\ 7ZnSO_4 + 4FeS_2 + 4H_2O \\ \qquad = 7ZnS + 4FeSO_4 + 4H_2SO_4 \end{cases}$$

Value. The quantity of metal necessary to make mining operations profitable depends largely on the character of the ore. Lake Superior copper ores contain as little as 0.65 per cent of native copper; and many copper-sulphide ores running as low as 2 or 3 per cent metallic copper are successfully worked. Many low-grade lead and zinc ores are profitably worked because their gold and silver contents more than pay the cost of metallurgical treatment. Gold ores alone, running as low as $2 to $3 per ton, can be successfully worked under favorable conditions. In nearly every case the metallic content of the ore is increased by mechanical concentration or by roasting (in the case of sulphides), or both, before the ore is smelted.

Classification. Numerous attempts have been made to develop a suitable classification of ore deposits, and the schemes suggested have been based either on the form, mineral contents, or mode of origin of the ore body. The first is perhaps the most practical from the miners' standpoint. The second is undesirable because several kinds of ore may often be found in the same ore body. The third is probably the most scientific, and is of value to the mining geologist and mining engineer, as it serves as a guide towards judging the possible extent or irregularity of the ore masses under consideration. The classification proposed by W. H. Weed, which is given below, includes the most recent discoveries and ideas on the origin of ore deposits. This classification is based entirely on the origin of the ore mass.

GENETIC CLASSIFICATION OF ORE DEPOSITS

I. Igneous (magmatic segregations).
- A. Siliceous: Aplitic masses, quartz veins of Alaska, etc.
- B. Basic: Peripheral masses and dikes.

II. Pneumatolytic Deposits (deposited by igneous emanations, the gases being above the critical point).
- A. Contact metamorphic deposits (characterized by gangue of garnet, epidote, actinolite, calcite, and other lime-alumina silicates).

B. Veins. (Closely allied to magmatic veins and to division IV.)

III. Fumarole Deposits (metallic oxides, etc., in clefts in lavas, of no commercial importance).

IV. Gas-Aqueous Deposits (igneous emanations mingled with ground waters).
  A. Filling Deposits: Fissure veins, impregnations of porous rock, and cementation deposits.
  B. Replacement Deposits: Veins, stocks, chimneys, etc., formed by replacement of wall rock.

V. Deposits from meteoric waters.
  A. Underground: Veins and replacements.
  B. Surficial: Bog ores, gold placers, etc.

Igneous ore deposits, constituting the first division, are those in which the metallic minerals have crystallized directly from the igneous magma during cooling. Such deposits may occur in dikes or on the periphery of igneous masses, the collecting or gathering of the ore particles being the result sometimes of mutual attraction or again of convection currents set up during cooling. In pneumatolitic deposits it is considered that the conditions bear out the statement that the igneous mass during its intrusion and cooling may give off metallic minerals, siliceous compounds, and gases. Thus, at San José, Tamaulipas, Mexico, a great laccolitic mass of andesitic rock has penetrated a Cretaceous limestone, the latter being a nearly pure carbonate of lime, and yet in the contact zones are found garnet, magnetite, pyrite, and chalcopyrite, all (except the garnet) containing matter foreign to the limestone. All of these must therefore have been emissions from the igneous magma. The gas-aqueous deposits include those which have been deposited from a mixture of water and steam, probably under pressure and at a high temperature. They may either fill true fissures or porous deposits or replace the wall rock lining a narrow fissure. The last class recognized is the result of meteoric circulation, the waters carrying the ore particles to points of concentration; this may occur either underground or on the surface.

Distribution. Ore deposits are not confined to any particular geological horizon, although the mechanically formed and some of the surficial ones are commonly of Pleistocene and less often of Tertiary age. In the United States ore deposits are widely distributed, but, owing to their frequent association with igneous rocks, they predominate in the Cordilleran region, Black Hills, and the Appalachians, where igneous activity has been most pronounced. In other areas their accumulation seems to be chiefly the result of meteoric waters. Gold and silver ores are chiefly restricted to fissure veins, and hence predominate in the Cordilleran region, although additional vein deposits of gold are known in the Black Hills, southern Appalachians, and Alaska.

Copper ores are known in large deposits in Keweenaw Point, Mich., Bisbee, Clifton, Miami, etc. Ariz., Bingham, Utah, and Butte, Mont. The Paleozoic limestones of Missouri and the region covering the contact point of Iowa, Illinois, and Wisconsin contain both lead and zinc, and large zinc deposits are mined in the Cambrian limestones of northwestern New Jersey. The hematite iron ores of the Lake Superior region are the largest deposits in the world, but iron ores are worked in the Silurian of the Appalachian region and the metamorphic rocks of the Adirondacks. For further details regarding the distribution of ore deposits, see COPPER; GOLD; IRON; SILVER; also the paragraphs on mining under the different countries.

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ORE DRESSING, CONCENTRATION OF ORES, WASHING OF ORES, SEPARATION OF ORES. The preparation of ore for the smelter or market, by hand or mechanical means, whereby the valuable minerals are concentrated into smaller bulk and weight by the separation of the waste, or whereby two or more valuable minerals are separated from each other. Ore dressing differs from metallurgy (q.v.) in that the separation is made by mechanical means, whereas in metallurgy the separation is made chemically. Extraction of gold from ores by amalgamation must be considered as an ore-dressing operation, and extraction by cyaniding, although often termed ore dressing, is, strictly speaking, a metallurgical operation.

The objects of ore dressing are: First, the concentration of the valuable minerals into smaller bulk, thereby increasing its value and reducing freight and smelting charges. Most ores of copper, zinc, and lead are too low grade to be smelted at a profit and must first be concentrated. A second object is to separate two or more valuable minerals such as a mixture of galena (lead sulphide) and blende (zinc sulphide) or blende and pyrite (iron sulphide), where the mineral of lesser value is usually a detriment and decreases the value per ton of the more valuable mineral. By separating such minerals before smelting the mineral which was of no value, or a detriment, is made valuable and the value of the more prominent mineral is increased. With nonmetallic minerals such as coal, graphite, precious stones, asbestos, etc., the separation must be made mechanically.

Before deciding on a process the physical properties of the minerals to be separated and of the gangue rock must be carefully considered.

Hardness.—Exceptionally hard ores increase the wear on crushing and conveying machinery. Centrifugal pumps for elevating the crushed ore should under these conditions be avoided as far as possible, and other precautions should be taken in the general design of the mill to reduce so far as possible unnecessary wear and repairs. With ores occurring in a very soft matrix, such as phosphate rock with a large percentage of clay, the ordinary jaw breaker and rolls cannot be used for crushing, and a specially designed crusher consisting of a roll with projections and revolving in fixed bearings, with a fixed steel plate opposite the face of the roll, has been designed to meet this requirement. See GRINDING, CRUSHING, AND PULVERIZING MACHINERY.

Brittleness.—When ores contain brittle minerals such as galena or copper glance a large percentage of fines or slimes will be produced, causing high losses unless special precautions are taken in crushing and screening.

Fracture.—Ores fracturing into shapes resembling needles, such as asbestos, or flat scales, such as mica, settle in water or air differently from ores breaking into a granular product. Certain zinc ores break into scales on being crushed, causing great difficulty in making a high recovery by gravity concentration in water.

Color.—Where the *color* of the mineral is so pronounced as to make it easy to distinguish high-grade ore and waste rock from the medium grade or mill ore, preliminary separation by hand picking is often introduced.

Specific Gravity.—Difference in specific gravity affords one of the surest means of separating minerals from waste. This property is largely made use of in concentrating ores containing heavy minerals.

Adhesion is made use of in separating free gold by amalgamation and certain sulphide minerals with oils. The latter method is known as the flotation process.

Magnetism is used for separating strongly or weakly magnetic minerals from nonmagnetic minerals. *Electrical conductivity* is used in connection with the electrostatic machines.

A process for treating ores usually consists of two or more successive steps based upon the physical properties. In each case the preliminary step prepares the ore for the succeeding steps, and in no case are one or two of the steps complete without the others. The subject naturally divides itself into the two main heads of crushing or preparation of the ore and the separation of the valuable minerals from the waste rock.

Breaking and Crushing. After the preliminary breaking of the ore by blasting in the mine and transportation to the mill, the final breaking and crushing preparatory to separation are performed. The object of crushing is to detach or unlock the valuable minerals from one another and from the waste rock with which they are associated. The extent to which this operation is carried depends largely upon the size of the valuable minerals or the size at which the valuable mineral is liberated. The various machines used for this work are described under GRINDING, CRUSHING, AND PULVERIZING MACHINERY. Various machines are installed in series, such as breakers, crushers, and pulverizers. Jaw or gyrating breakers will reduce the ore to about 1½ inches in size; rolls will take a feed of about 1½ to ½ inches and reduce the size to from ¾ inch to 10 mesh; a few pulverizers will take a feed of 1½ inches, but most pulverizers require preliminary crushing to about ¼ inch; they will reduce the size to below 50 to 200 mesh.

Preliminary Separating. The ore from the mine is usually discharged to *bar screens* or *grizzlies;* these may be placed horizontally or at an angle not to exceed 45 degrees. They consist of parallel bars of iron spaced from 2 to 6 inches and sometimes from 6 to 10 inches apart; usually the bars are stationary, but in some instances the bars are oscillated or attached to an eccentric to produce a forward-and-backward movement. The object of stationary bar screens is to furnish an opportunity for rejecting coarse waste rock by hand, thereby saving the cost of breaking, and to prevent large lumps from falling into the ore bin which might clog the breakers or machinery which follows. When ores carry a large amount of clay *preliminary washers* follow the grizzly. Their object is to disintegrate the clay and permit of its being washed away. In the southern Appalachians, where many ore deposits occur in clay (phosphate, iron ore, and baryte), a special machine known as the *log washer* has been developed and is extensively used. It consists generally of two logs, to which are attached paddles revolving in opposite directions in a wooden box. The logs are placed at a slight inclination and the face of the paddles at such an angle that the ore is raised to the surface between the logs, where it is exposed to jets of water for separating the clay. The material to be washed is fed at the lower end of the logs; the washed ore is transported forward by the paddles and discharged from the upper end; the clay is washed to the feed end of the box, where it is allowed to overflow through an opening in the side of the box. Single log washers are sometimes used following the double log for a final washing. The logs vary from 15 to 30 feet in length and the width of a double log washer is about 4 feet.

Hand picking is the process of separating by hand the high-grade or shipping ore and the waste or barren rock from the finely disseminated or mill ore. The chief advantages are less loss of pure mineral resulting from crushing the high-grade ore and greatly increased capacity of the mill by discarding the waste rock. This operation is first introduced on the larger sizes at the grizzly and following the preliminary washers. The mill ore is then broken to about 2 inches, the material under 1 inch eliminated by screening, and the product between 1 inch and 2 inches again hand picked. There are various classes of picking tables used for this work, such as belt, rope, or plate conveyers, revolving circular tables, stationary horizontal tables, stationary sloping chutes, and shaking tables. The first two are most often used. In South Africa about 25 per cent of the ore mined is discarded by hand before feeding the mill ore to the stamps. Hand dressing is becoming more popular in the United States and has been introduced into many of the new gold-silver and lead mills recently erected. The mill ore is combined with the product too small to hand pick and is fed to sizing and crushing machinery preliminary to mechanical separation.

Coarse Separating. The finely disseminated ore, or *mill ore,* which has been crushed so as to liberate the mineral from the gangue, is separated by sizing followed by classifying, or classifying followed by sizing. On the coarser sizes, ranging from ¾ inch to about 10 mesh, the ore is first sized by screens and then fed to classifiers, such as jigs, where the mineral is separated from the waste.

Sizing screens may be classified as: (1) stationary screens, comprising (*a*) grizzlies, or bar screens, which usually receive the ore as it comes from the mine and separate the very coarse lump from the finer material, (*b*) gravel screens of wire cloth such as are used for separating gravel from sand, (*c*) perforated metal, which is used in a few of the large mills on dry ore for sizing into a number of products; and (2) moving screens, comprising (*a*) oscillating bar screens, used mostly in the handling of coal, (*b*) shaking screens, placed horizontally or at a slight angle, (*c*) impact screens, placed at angles of from 30° to 45°, and (*d*) revolving screens, or trommels. Revolving screens, which are the most common, may again be subdivided into cylinders and prisms, cones and pyramids, and spirals. The revolving cylindrical screen is the type generally used in mills where a separation of heavy minerals from light minerals or gangue rock is required. These screens are generally erected in series of three, with the largest openings in the first screen. Their construction consists usually of a central shaft of soft steel suitably supported in bearings to give the proper slope; on the shaft are two or more spiders with four radial spokes to the ends of which are attached wrought iron tires; the screening surface, consisting of punched steel plates or woven wire, is then wrapped around the tires, forming a cylinder, and held in place by tightening hoops. The crushed ore is fed to screen No. 1; the coarse ore, known as *oversize*, is discharged from the end of the screen, returned to crushers, and again fed to screen No. 1; the fine ore which passes through the holes in the screen, known as *undersize*, is fed to screen No. 2; the oversize from screen No. 2 is a sized product and is fed to a separator; the undersize is fed to screen No. 3, which gives a sized product for separating and an undersize which must be classified preliminary to sizing.

The sized products from the screens, such as ½-inch to ¼-inch and ¼-inch to ⅛-inch, are usually fed to *hydraulic jigs* which operate through the action of alternating upward and downward currents of water upon a bed of ore supported on a screen. The screen may be stationary, in which case the water is moved by a plunger, or it may be moved up and down in a tank of water. In either case the same effect is obtained, that of separating the ore into layers according to the specific gravity of the mineral; the heavy mineral settles to the bottom and is drawn off through a suitable gate, and the light mineral rises to the top and is washed away. See JIG.

Fine Separating. The undersize from the third sizing screen is usually finer than 10 mesh. This product, containing sands and slimes, is fed to classifiers and the products from the classifiers to some form of sizing machines such as concentrating tables. *Classifiers* are devices for separating fine sands into a series of products of diminishing sizes where the coarser grains of each product consist of waste rock and the finer grains the mineral. The most common form of free settling classifier consists of a channel connecting a series of pockets. Water is supplied to each pocket so as to form an upward current, the force of the current in each pocket after the first being less than that in the preceding pocket. The effect produced is that grains which are heavy enough to settle against the upward current in each pocket can do so, while the lighter grains are carried on to succeeding pockets until they strike one where the current is mild enough to permit them to settle. Usually two or three classified products, known as sands, are obtained for separating, and the overflow from the last classifier, containing slimes suspended in water, is sent to settling boxes, where the solids are settled and drawn off to some form of slime table for separating the mineral from the gangue.

The sands from the hydraulic classifier are fed to some form of *concentrating table*. Until the invention of the Wilfley table in 1896 the Gilpin County end-bump table, with cam, springs and bumping post, was extensively used. Many excellent tables embodying the Wilfley principle are in use, and a brief description of the Wilfley riffle jerking table will serve to illustrate how the mineral is separated from the gangue. The table consists of a deck approximately 16 feet long by 6 feet wide and suitably supported on toggles to permit of a horizontal jerking motion. The deck surface is covered with linoleum on which are tacked a series of tapered riffle cleats ending along a diagonal line across the table, the longest cleat being along the lower or tailings side and extending the full length of the table. Motion is imparted to the deck through toggles connected to a pitman which is raised and lowered by a crank shaft. The resultant motion is a gradually increasing speed of the surface of the table until the maximum speed is reached, when a quick return is given to the table in the opposite direction. This quick return or jerking motion causes the ore to travel forward, the heavier and larger grains advancing beyond the lighter and smaller grains. The surface of the deck slopes slightly towards the discharge edge. The classified ore to be separated is fed, together with water, at the head or upper end of the table. The ore feed extends about one-third the length of the table, and wash water is added for the rest of the length. The lighter material in the feed is immediately washed across the surface of the riffles and discharged as waste. The coarser grains are jerked forward along the deck of the table. The mineral is caught in the riffles, and the lighter grains of waste rock are washed over the top of the riffles by a thin film of wash-water and discharged from the lower or tailings side of the table. The heavy valuable mineral retained by the riffles travels forward and forms a diagonal line across the top of the table just in advance of the coarse grains of light gangue; the heavy minerals are discharged in a separate launder or box from that in which the tailings are discharged. For separating the mineral from very fine sands or slimes obtained from the settling boxes, vanners, buddles or round tables, and canvas tables are used.

Vanners consist essentially of an endless rubber belt which is shaken rapidly either sidewise or endwise and which has a continuous slow motion uphill. The ore is fed on to the belt in the form of wet pulp. The agitation makes the ore bed so loose that particles of lighter specific gravity rise to the upper layer. The travel of the belt draws the heavy minerals to the head end, while the water washes the light minerals down to the tail. The feed to and the discharge of mineral and concentrates from the vanner are continuous.

Buddles or *film sizing tables* depend upon the relative transporting power of a film of water flowing on a quiet surface to act upon the powdered ore. As is well known, a film of water flowing over a quiet surface has an upper current which moves faster than the lower current, whose water is retarded by friction; the heavier grains remain at rest in the slow bottom current, while the lighter grains are carried away by the quick top current. In the early designs the circular table top revolved; the feed in the centre of the table, the discharge launders at the periphery of the table to receive concentrates and tailings, and the wash-water jets were made stationary. This design was improved upon by building a stationary table top of concrete and revolving the feed spout, discharge launders, and wash-water jets with the same speed so as to maintain the same relative position. With improvements in concentrating machinery this type of table was gradually replaced by one requiring less floor area. Recently the round table has been again introduced and the excessive floor area required overcome by building a series of decks one placed above another.

Canvas tables, although at one time largely used in gold milling, have been almost entirely abandoned because of metallurgical developments in the cyanide process. They were used for separating the mineral from the finest slimes. The stationary decks were covered with canvas and the slimes allowed to wash over the surface. The heavy mineral was retarded in its flow by the nap on the canvas, while the lighter waste rock washed away.

Miscellaneous Processes. Recently various processes which had been considered laboratory methods and are dependent on the physical properties of minerals, have been commercialized. Two types of *magnetic separators* are in use. For minerals which are highly magnetic weak magnets are used; for minerals which are weakly magnetic strong electromagnets are used. In one type the ores are fed below the field of the magnet on a conveyer belt; the magnetic ore is raised from the conveyer belt to the magnet, which in turn is covered by an endless belt traveling at right angles to the main conveyer belt; the magnetic ore is held against this transverse belt while in the magnetic field, and travels with it until beyond the magnetic field, when it is discharged from the bottom of the belt at one side of the main conveyer belt; the nonmagnetic minerals remain on the main conveyer belt and are discharged at the far end. There are many types of magnetic separators and the above serves as a general description for the principle. Magnetic minerals may be separated from nonmagnetic and weakly magnetic from strongly magnetic or nonmagnetic by varying the intensity of the magnetic field.

Electrostatic separators depend upon the difference in the electrical conductivity of minerals and not on magnetism. Many metallic sulphides and other minerals are good conductors, while most gangue minerals and certain sulphides are relatively poor conductors. The principle upon which electrostatic separators depend is that two bodies charged alike electrically repel each other, while if charged oppositely they attract each other. If a mixture of good and poor conductors in a neutral state be dropped upon a highly charged conducting surface, the good conductors immediately receive a charge similar to that of the surface upon which they are dropped and are repelled, while the poor conductors fall from the surface without being repelled. By introducing a divider or partition at a point between the discharge of these grains a separation of the minerals is accomplished.

The separation of diamonds from the jig concentrates by *adhesion* of the diamonds to a greased plate was devised at the DeBeers Diamond Dressing Works. The concentrates as fed to the greased plates contain about 2 per cent of diamonds, and the extraction by this process is practically perfect. The *flotation process*, which has only recently been introduced into some of the large mills, depends for its separations on the selective action of certain oils for certain minerals. Many of these separations cannot be made by other processes. The ores to be separated are finely ground, moistened with water, and then oil is added and the mixture thoroughly agitated. The minerals adhere to the oil and are floated to the surface; the waste rock or gangue sinks in the water. The floated minerals are drawn off and the excess of oil separated in a centrifugal machine. Another flotation process which has been successfully used in Australia depends upon the selective action of carbonic-acid gas for certain minerals. In this process the gas which is generated in contact with the finely ground ore immersed in water attaches itself to the mineral and floats it to the surface. The ore is then drawn off and settled. Many other processes are used on special ores, such as pneumatic separations, decrepitation and screening, preliminary roasting to make the ores more porous, centrifugal separations, and weathering.

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OREGLIA DI SANTO STEFANO, ô-rā′lyȧ dê sän′tô stā′fȧ-nō, Luigi, Cardinal (1828–1913). An Italian Roman Catholic cardinal, born at Bebe Vaginena. He entered the Church at an early age, became titular Archbishop of Damietta in 1866, and in 1873 was created Cardinal by Pius IX. Most of his life was spent at Rome, where he became known for his bitter opposition to modernism. He was several times mentioned as a possibility for Pope.

OR′EGON. A Pacific coast State of the American Union, lying between lat. 42° and 46° 18′ N. and long. 116° 33′ and 124° 32′ W. It is bounded by California and Nevada on the south, Idaho on the east, and Washington on the north, from the latter of which it is in large part separated by the Columbia River. It is of oblong form, about 275 miles from north to south and 375 miles from east to west. It has a total area of 96,699 square miles, of which 95,612 square miles are land surface. Only about 1.13 per cent of the surface of Oregon is occupied by lakes. It ranks ninth in size among the States.

Topography. Oregon is divided into two sections, quite distinct in physical characteristics, by the Cascade Mountains, extending through it north and south. Western Oregon comprises about one-third and eastern Oregon two-thirds of the State as a whole. The south half of western Oregon is almost wholly occupied by the Siskiyou Ridge of the Klamath Mountains with outlying spurs. Into the Klamath Mountains, occupying southwest Oregon and north California, the Cascade and Coast ranges are merged in this latitude. The Siskiyou cluster of mountains in the southwest corner represents one of the two original islands around which geological forces built up the present areas of Oregon. The other nucleus is represented by the Blue Mountains in the northeast corner. In the north half of western Oregon the Coast and Cascade ranges are separated by the valley of the Willamette River. This drains into the Columbia. The Coast Range occupies a strip of broken country some 40 miles wide along the coast; the Willamette valley is a comparatively level strip some 60 miles wide, its east border merging into foothills and subranges of the Cascade Mountains. The Blue and Wallowa Mountains occupy the northeast quarter of Eastern Oregon. Like the Siskiyous, they emerged early in geological times, and around them the other sections were built up. The central and southern portion east of the Cascades constitutes a great inland plateau, broken in the southeast corner by a mountainous fault, Stein's Mountain. As a whole this area comprises the Oregon portion of the great basin of western North America. Eastern Oregon is semiarid except on the higher slopes. Its rivers drain into the Snake, which flows along the north half of the east boundary and into the Columbia. The rainfall of the central portion is so slight that there is no surplus run-off. The Snake River in breaking through the Blue Mountains and the Columbia River in passing the inland plateau and through the Cascade Range cut wonderful gorges and have rapid descents that furnish sites for great power development. The Deschutes River, which parallels the Cascade Mountains through some two-thirds the width of the State and is fed from the porous lava reservoirs of these mountains, has a remarkably even flow throughout the year.

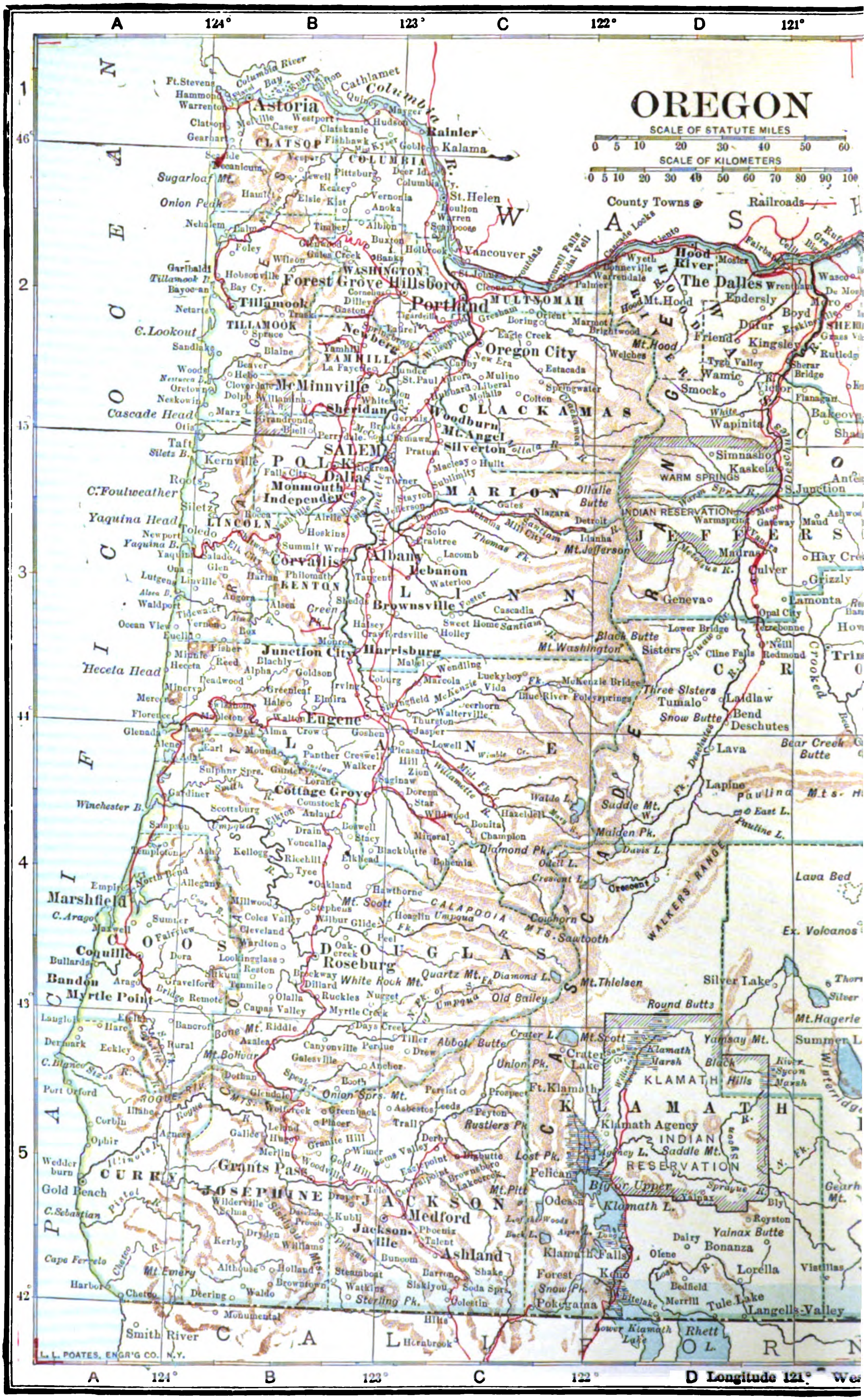
In the relief features as a whole the Cascade Mountains dominate. The range averages nearly 6000 feet and is studded with snow-covered peaks, which are extinct volcanic cones. Beginning at the north, Mount Hood rises almost sheer from the banks of the Columbia to an altitude of 11,225 feet. Next in order to the south is Mount Jefferson (10,200 feet). The Three Sisters, Bachelor, and Diamond peaks all have one or more glaciers on their sides. To the south of these, where Crater Lake now is, was Mount Mazama. Here was during the glacial period an active volcano. Its outpourings left a chasm into which the summit of the mountain fell, so that there now exists a crater 6 miles wide and 4000 feet deep, half filled with water, which constitutes the lake. The Wallowa Mountains, in the extreme northeast corner, a part of the Blue Mountain system, have a general elevation of 8000 feet. The Siskiyou and Coast Range mountains do not rise above 4000 feet. The Pacific coast line of Oregon is not deeply indented, but short promontories formed by projecting spurs of the Siskiyous and the Coast Range are numerous. The action of the prevailing winds and the continual wash of the waves have formed a more or less capacious landlocked harbor at the mouth of each one of the rivers.

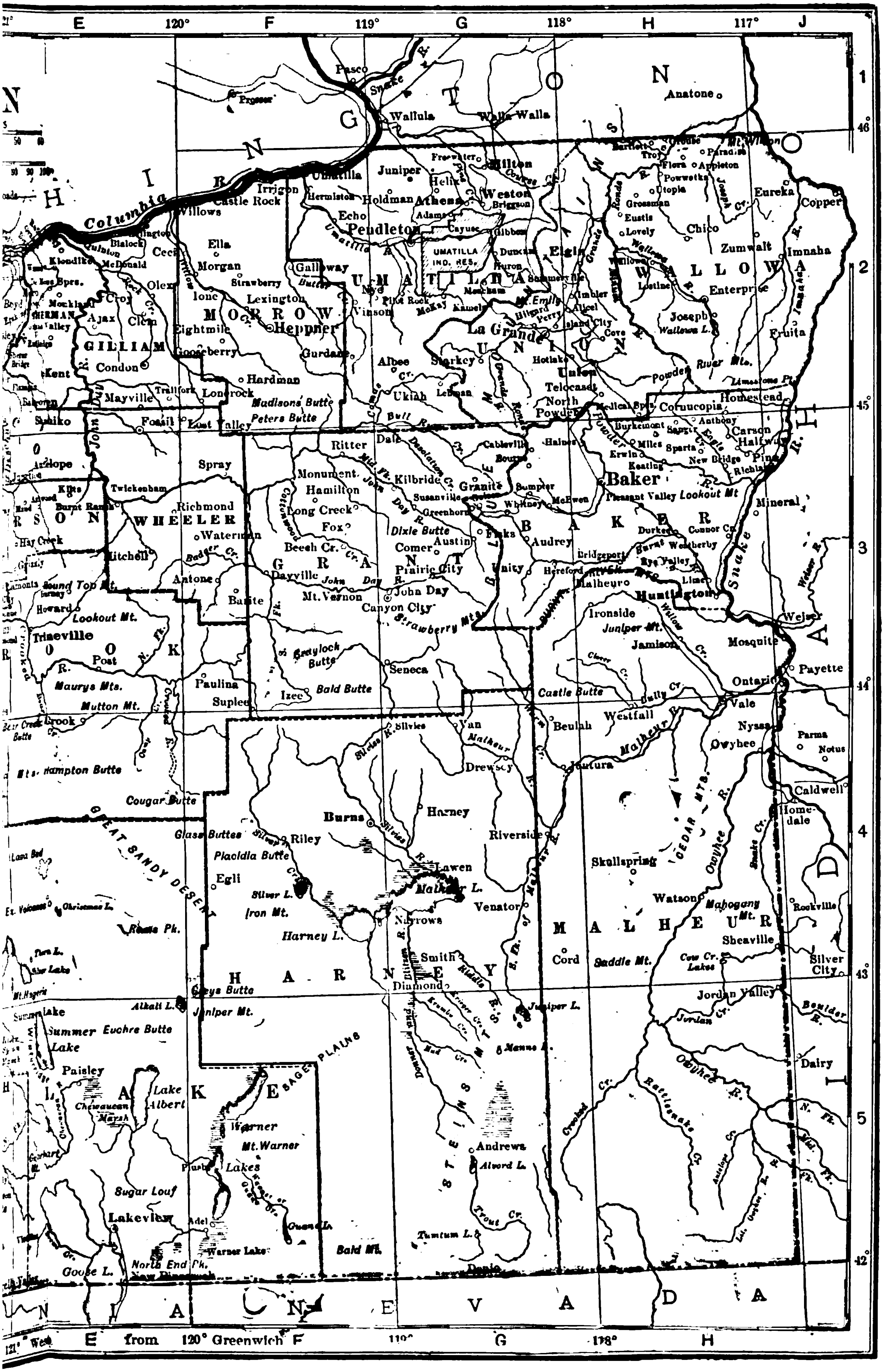
Hydrography. Oregon is mainly a portion of the Columbia River basin. However, there is the south-central plateau section where the rivers discharge into landlocked lakes. These are shallow and are largely playas, except when evaporation is balanced or exceeded by inflow. Neither does the run-off of southwest Oregon and of the west slope of the Coast Range reach the Columbia, for the rivers of these latter areas drain directly into the Pacific. The drainage of this south half of western Oregon is directly into the Pacific through swiftly flowing rivers that afford large opportunities for power development. These are the Rogue, Coquille, Umpqua, and Siuslaw.

The waterways with a flow ample for navigation include the Willamette (q.v.), the Columbia (q.v.) up to the point where it first touches the boundary, and the lower Snake to where it issues from the Blue Mountains. All the streams of western Oregon, with their fairly uniform and abundant flow, originating in sources high up in the Coast and Cascade ranges, afford great possibilities for power development.

Climate. The Japan Current with the prevailing southwest winds of its winter months gives Oregon a mild, moist winter climate. On the other hand, the almost constant trade winds of midsummer give the atmosphere of that season a very low humidity and insure uniformly cool nights. The unbroken Cascade Mountains cause a humid western Oregon and a semiarid condition in at least the southern portion of eastern Oregon. In western Oregon the Coast Range produces in a lesser degree a similar contrast between the rainfall on its west slope and that in the Willamette, Umpqua, and Rogue valleys lying to the east of that range. The rainfall averages are from 75 to 138 inches along the coast, from 45 inches at the north to 20 inches at the south in the valleys west of the Cascade Mountains, from 12 to 25 inches on the foothills and valleys of the Blue Mountains, from 10 to 15 inches in the Columbia valley east of the Cascades, and from 8 to 22 inches on the high central plateau. The higher precipitation in each of these meridian belts is always in the north. The maximum precipitation occurs in the winter, when gentle rains may continue for days or weeks at a time in the western portion; the summers are relatively dry. Contrasts in the range of variations of summer from winter temperatures are likewise caused by the Cascade Mountains. In passing across these mountains from the west there is a transition from a decidedly equable climate to one of much wider variations between the averages of the summer and the winter temperatures. In the coastal strip the greatest annual range is from 10° to 97°, with an average of 217 days between frosts; in the valley strip between the Coast and the Cascade ranges the minimum in the north is — 2°, in the south — 4°, the maximum being 102° in the north and 108° in the south. In the great central plateau section of eastern Oregon, where the elevation is some 4000 feet, the extremes of temperature, both daily and yearly, are more marked, and frosts have occurred every month in the year, though rarely severe enough to damage crops. Nights are cool throughout the State, thunderstorms are rare, while hurricanes and tornadoes are almost unknown.

Soil. In the southwest and in the northeast the rock formations belong to early geological eras. Granites, limestones, and metamorphic rocks abound. These determine the character of the soils of these sections. Volcanic rocks predominate in the other sections, except in


OREGON
SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60
SCALE OF KILOMETERS
0 5 10 20 30 40 50 60 70 80 90 100
County Towns
Railroads
A
124°
B
123°
C
122°
D
121°
1
2
3
4
5
46°
45
44
43
42
PACIFIC OCEAN
WASHINGTON
Columbia River
Astoria
CLATSOP
COLUMBIA
St. Helens
Rainier
Kalama
Vancouver
Tillamook
TILLAMOOK
Forest Grove
Hillsboro
WASHINGTON
Portland
MULTNOMAH
Oregon City
CLACKAMAS
Hood River
HOOD RIVER
The Dalles
WASCO
YAMHILL
McMinnville
Newberg
Sheridan
SALEM
POLK
Dallas
Monmouth
Independence
Woodburn
Mt. Angel
Silverton
MARION
Mt. Hood
Mt. Jefferson
WARM SPRINGS INDIAN RESERVATION
JEFFERSON
Madras
Culver
LINCOLN
Toledo
Newport
Yaquina Head
C. Foulweather
Cascade Head
C. Lookout
BENTON
Corvallis
Albany
Lebanon
LINN
Brownsville
Harrisburg
Junction City
Heceta Head
LANE
Eugene
Florence
Cottage Grove
Three Sisters
Bend
Redmond
CROOK
DESCHUTES
Mt. Washington
Diamond Pk.
Crescent L.
Odell L.
Cascade Range
Walkers Range
Marshfield
North Bend
Coquille
Bandon
Myrtle Point
COOS
DOUGLAS
Roseburg
Mt. Thielsen
Crater L.
Mt. Scott
Klamath Agency
KLAMATH INDIAN RESERVATION
KLAMATH
Upper Klamath L.
Klamath Falls
Lower Klamath Lake
Rhett L.
Tule Lake
Langells Valley
CURRY
Gold Beach
Port Orford
C. Blanco
Cape Ferrelo
Harbor
JOSEPHINE
Grants Pass
JACKSON
Medford
Jacksonville
Ashland
Mt. Pitt
Siskiyou
Sterling Pk.
Silver Lake
Summer L.
Lava Bed
Ex. Volcanos
Paulina Mts.
CALIFORNIA
L. L. POATES, ENGR'G CO. N.Y.
D Longitude 121° West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42
W A S H I N G T O N
Pasco
Snake R.
Prosser
Wallula
Walla Walla
Anatone
Columbia R.
Umatilla
Juniper
Irrigon
Castle Rock
Willows
Hermiston
Holdman
Helix
Freewater
Milton
Weston
Athena
Adams
Echo
Pendleton
Umatilla R.
Cayuse
UMATILLA IND. RES.
Gibbon
Duncan
Elgin
Huron
Nye
Vinson
Pilot Rock
McKay
Kamela
Meacham
Mt. Emily
Summerville
Imbler
Alicel
Hilgard
Perry
Island City
Cove
La Grande
U N I O N
Starkey
Hot Lake
Union
Telocaset
North Powder
Albee
Ukiah
Lehman
Camas Cr.
Bull R.
Troy
Flora
Paradise
Appleton
Powwatka
Utopia
Grossman
Eustis
Lovely
Bartlett
Mt. Wilson
Grande Ronde R.
Joseph Cr.
Eureka
Copper
Chico
Zumwalt
Imnaha
Wallowa R.
Willowa
Lostine
W A L L O W A
Enterprise
Joseph
Wallowa L.
Imnaha R.
Fruita
Powder River Mts.
Limestone Pt.
Homestead
Cornucopia
Medical Spgs.
Anthony
Carson
Halfway
Pine
Richland
Eagle Cr.
Sanger
Sparta
Burkemont
Miles
Erwin
Keating
New Bridge
Baker
Powder R.
Haines
Cableville
Bourne
Sumpter
McEwen
Pleasant Valley
Lookout Mt.
Mineral
Durkee
Connor Cr.
Weatherby
B A K E R
Burnt R.
Bridgeport
Rye Valley
Lime
Huntington
Weiser
Weiser R.
Snake R.
Mosquite
Payette
Ontario
Vale
Nyssa
Owyhee
Parma
Notus
Caldwell
Homedale
Gallaway
Butter Cr.
Ella
Morgan
Strawberry
Lexington
Ione
Willow Cr.
M O R R O W
Heppner
Eightmile
Gooseberry
Gurdane
Hardman
Lonerock
Madisons Butte
Peters Butte
Lost Valley
Arlington
Blalock
Quinton
McDonald
Klondike
Cecil
Olex
Rock Cr.
Rock Crk.
Mockland
Moro
Grass Valley
Ajax
Clem
Kent
G I L L I A M
Condon
Mayville
Trailfork
Fossil
Shaniko
John Day R.
Antelope
Kilts
Twickenham
Richmond
W H E E L E R
Waterman
Spray
Ritter
Dale
Desolation Cr.
Monument
Hamilton
Kilbride
Susanville
Greenhorn
Long Creek
Fox
Dixie Butte
Austin
Granite
Whitney
Beech Cr.
Comer
G R A N T
Prairie City
Dayville
John Day
Mt. Vernon
Canyon City
Strawberry Mts.
Unity
Hereford
Malheur R.
Malheuro
Ironside
Juniper Mt.
Jamison
Willow Cr.
Mitchell
Badger Cr.
Antone
Bauite
Round Top Mt.
Howard
Lookout Mt.
Prineville
C R O O K
Post
Maurys Mts.
Mutton Mt.
Paulina
Suplee
Izee
Graylock Butte
Bald Butte
Seneca
Castle Butte
Westfall
Bully Cr.
Beulah
Crook
Hampton Butte
Cougar Butte
Silvies
Silvies R.
Van
Malheur R.
Drewsey
Juntura
Harney
Burns
Riverside
Riley
Glass Buttes
Placidia Butte
Egli
Silver L.
Iron Mt.
Lawen
Malheur L.
Harney L.
Narrows
Venator
Skullspring
CEDAR MTS.
Owyhee R.
Succor Cr.
Watson
Mahogany Mt.
Rockville
Sheaville
M A L H E U R
Cord
Saddle Mt.
Cow Cr. Lakes
Silver City
Jordan Valley
Jordan Cr.
Boulder R.
Smith
H A R N E Y
Diamond
Kiddle
Grays Butte
Juniper Mt.
Juniper L.
Mann L.
Donner und Blitzen R.
Kiger Cr.
Mud Cr.
STEINS MTS.
Alkali L.
Summer Lake
Euchre Butte
Paisley
GREAT SANDY DESERT
Christmas L.
Rosses Pk.
Chewaucan Marsh
Lake Albert
L A K E
Warner
Mt. Warner
Plush
Warner Lakes
Gearhart Mt.
Sugar Loaf
Lakeview
Adel
Guano L.
Bald Mt.
Warner Lake
North End Pk.
Goose L.
SAGE PLAINS
Andrews
Alvord L.
Trout Cr.
Tumtum L.
Denio
Crooked Cr.
Rattlesnake Cr.
Antelope Cr.
Owyhee R.
Dairy
N. Fk.
Mid. Fk.
I D A H O
N E V A D A
C A L I F O R N I A
E
from
120° Greenwich
F
119°
G
118°
H

the Coast Range, where sandstone is the more common foundation. Where the weathering process that brought about disintegration took place under humid conditions, as in western Oregon, clay loams rich in humus were formed. Under the semiarid conditions of the most of eastern Oregon a more sandy soil resulted, except where much volcanic ash is present. In the main the soils are very fertile, containing volcanic ash and decomposed lava. Disadvantages caused by the slight rainfall and dry climate are overcome by irrigation. All of western Oregon, except the south slopes of elevations, tends to be forested. At least one-sixth of the standing merchantable timber of the United States is found in Oregon. In eastern Oregon only the mountain slopes and river banks are timbered. That section generally is covered with sagebrush. A succulent "bunch grass" gives it value for live stock. The most abundant tree is the Douglas fir. It grows up to 300 feet in height and 15 feet in diameter. The tideland or Sitka spruce is the largest tree of Oregon and is also very useful. It attains a diameter of 20 feet. The western yellow pine, the sugar pine, and the western white pine are the valuable pines. The western hemlock is also abundant and has many uses. Cedars, junipers, laurel, a myrtle, many varieties of willows, and several oaks and maples and ash are common.

Geology. The land which is now Oregon began its geological history as two island areas. The Siskiyou Island in the southwest formed the foundation of what is now the Siskiyou Ridge of the Klamath Mountains. The Shoshone Island became the basis of the Blue and Wallowa Mountains. These appeared at least as early as the close of the Carboniferous period. Then there was a long interval during which sedimentary deposits were being laid down around their margins. Upheavals probably were taking place, but in the Tertiary period began great outflows of lava that covered an area of 250,000 square miles in the Pacific Northwest. A depth of 3000 feet of such rock is exposed at the Columbia Gap. At Stein's Mountain in southeast Oregon a fault exposes a thickness of more than 5000 feet without revealing the lowest plane of the outflow. In the Willamette valley and in the borders of the lakes of southwest Oregon Pleistocene deposits occur. The great sheet-lava overflows are the characteristic geological features of Oregon.

Mining. Southwest Oregon has long been known for its widespread and varied mineral resources, among which gold, silver, copper, platinum, and coal are the most important. The gold rush of '49 landed many prospectors in this portion. Placers were opened, and placer mining has ever since continued to be a thriving branch of the mineral industry. The gold of the bedrock series in the Klamath Mountains, which include the Siskiyou and Salmon Mountains, was deposited in veins and pockets in connection with the upheaval of the mountains at the close of the Jurassic geologic period. Ever since then the disintegration and erosion of these rocks has furnished the gold for the auriferous gravels. On the eastern edge, particularly in Baker County, there are some quartz mines, and several productive placers. In 1913 the production was 78,740 fine ounces, valued at $1,627,710, an increase of over 100 per cent over 1912. The chief gold-producing county is Baker, but gold is also mined in Josephine and Lane counties. The clay products ranked next in value and in 1913, exclusive of pottery, were valued at $771,795. The clay products consist chiefly of common brick. There were also produced in that year 96,743 pounds of lead. The stone quarried in 1913, chiefly trap rock, was valued at $357,498. The silver production in 1913 was 179,036 fine ounces, valued at $108,139. The larger part of the silver is mined in Baker County. In 1914 Oregon produced 51,558 tons of coal, which was valued at $143,556. Coal mining is confined almost entirely to a district in Coos County. Other minerals produced are copper, occasional gems, lime, mineral waters, platinum, gypsum, and ochre. The total value of the mineral products in 1913 was $3,563,919.

Agriculture. Of an approximate land area of 61,188,480 acres, 11,685,110 acres were in farms in 1910. The proportion of land area utilized for agriculture is greater over the northern third, where the country is less mountainous and where the rainfall is heaviest. By far the more valuable land in Oregon is located west of the Cascades though irrigation is fast bringing eastern Oregon land into productive prominence. The acreage of improved land in farms in 1910 was 4,274,803, and the number of farms was 45,502. The total value of farm property, including land, buildings, implements, and machinery, live stock of all kinds, was $528,243,782, and the average value of farm land was $35.25 per acre. The average size of the Oregon farm was 256.8 acres. There is in the eastern portion a great amount of semiarid land, upon which are many stock ranches much greater in size than the farms utilized for general agricultural purposes. During the past few decades, however, these live-stock ranches have formed a constantly decreasing proportion. Of the total number of all farms, in 1910, 38,643 were operated by owners and managers and 6859 by tenants. The native-born white farm operators numbered 35,819, the foreign-born white farmers 9056, and nonwhite farmers 627. Of the nonwhite farmers 452 were Indians and the others Japanese, Chinese, and negroes. Of the foreign-born white farmers 2492 were born in Germany.

The following table gives the acreage production and value of some of the principal crops in 1914, as estimated by the United States Department of Agriculture:

CROPS	Acreage	Prod. bu.	Value
Corn	22,000	660,000	$541,000
Wheat	799,000	16,604,000	16,936,000
Oats	364,000	12,740,000	5,733,000
Barley	122,000	3,660,000	2,233,000
Potatoes	49,000	4,753,000	2,852,000
Hay	858,000	*1,716,000	15,787,000

* Tons.

The total value of crops in 1909 was $49,041,000, and the combined acreage was 2,281,288. More than one-third of the total value of crops in 1909 was contributed by the cereals, somewhat less than one-third by hay and forage, and about one-tenth by potatoes and other vegetables. The remainder, representing 23.3 per cent of the total, consisted chiefly of fruits, nuts, forest products, and hops. Hay and forage, the most important crop, had in 1909 an acreage of 939,979, a production of 1,587,796 tons, valued at $15,225,957. Wheat, the second largest crop, occupied 763,187 acres, which yielded 12,456,751 bushels, valued at $10,849,036. Oats ranked third in importance. There were harvested 339,162 acres of this cereal in 1909, the yield being 10,881,286 bushels, valued at $5,037,164. There were also 21,770 acres of hops, yielding 16,582,562 pounds with a value of $2,838,860. This is about one-third of the total hop crop of the United States. Potatoes, with an acreage of 44,265, had a production of 4,822,962 bushels, valued at $2,098,648. Barley, the only other crop with a production of over $1,000,000 in value, had an acreage of 108,847, a production of 2,377,735 bushels, valued at $1,513,310. The greater part of the production of oats, nearly all of the hops, and about half of the potatoes are produced in counties of the Willamette valley.

The region between the Cascade and Coast ranges, particularly Jackson and Douglas counties, has become noted for the production of fruit. There were, in 1910, 4,583,735 trees or vines of bearing age. The production of orchard fruits was 4,423,244 bushels, valued at $3,339,845. Of these the most important were apples, of which 1,930,926 bushels, valued at $1,656,944, were produced. The production of plums and prunes, only a little less than that of apples, was 1,747,587 bushels, valued at $838,783. Other orchard fruits produced in large quantities are pears, peaches, nectarines, and cherries. The production of grapes in 1909 was 3,206,874 pounds, valued at $98,776. Small fruits also form an important agricultural crop. In 1909 the production was 9,348,490 quarts, valued at $641,194. The most important of the small fruits is the strawberry. Others are raspberries and loganberries, blackberries and dewberries, gooseberries and currants. There is a considerable production of sugar beets, of which there were grown in 1909 15,606 tons, valued at $74,902.

Live Stock and Dairy Products. As noted above, considerable area formerly utilized for grazing purposes has been cut up into farms. This has brought about a considerable change in stock-raising conditions, although the industry is still of great importance. The total value of all live stock on the farms in 1909 was $58,243,921. According to the estimates of the United States Department of Agriculture there were on the farms in Jan. 1, 1915, horses numbering 304,000, valued at $27,360,000; mules, 10,000, valued at $960,000; milch cows, 310,000, valued at $13,335,000; cattle other than milch cows, 503,000, valued at $18,259,000; sheep, 2,563,000, valued at $11,534,000; swine, 360,000, valued at $3,420,000. The total number of fowls on farms in 1910 was 1,823,680, and they were valued at $1,067,743. The eggs produced numbered 11,906,903 dozens and amounted in value to $2,912,849. The total value of milk, cream, and butter fat sold and butter and cheese made was $6,067,024; the milk sold, 14,640,108 gallons, valued at $2,156,576; the butter made, 5,667,964 pounds, valued at $1,599,931.

Irrigation. Of the 45,502 farms in 1909, 6669 were irrigated. The acreage irrigated in that year was 686,129 acres, or 16.1 per cent of the improved land in farms. The area to which enterprises existing in 1910 were capable of supplying water was 830,526 acres, and the total acreage included in existing projects completed or under way in 1910 was 2,527,208 acres. The irrigation projects undertaken by the government included the Umatilla project and the Oregon Klamath project, part of which is in California. The net investment in these projects is over $5,000,000.

Forest Products. Oregon is one of the leading States in the extent and value of forest land. In 1908 there were 42,200 square miles of forest land, about 44 per cent of the area of the State. The most valuable forest product is from the Douglas fir (red fir or Oregon pine), the great strength of whose timbers makes them very desirable for use in construction work and rigging. This tree produces more commercial timber to the acre than any other tree on the American continent. In 1909 Oregon ranked ninth in the total cut of rough lumber. There were cut in that year 1,898,995 M feet B. M. In addition there were cut 161,512 thousands of lath and 293,644 thousands of shingles. Of the total cut for 1909, 1,895,950 M feet were soft wood, of which by far the greater part was Douglas fir, and 169,592 M feet Western pine; among other varieties are spruce, cedar, hemlock, and larch. There were only 3045 M feet of hardwood lumber produced, of which maple, cottonwood, ash, and oak were the chief varieties. In 1909 Oregon was second among the States in the production of Douglas fir, producing 32.6 per cent of the total. In 1913 there was sawed 2,098,467 M feet of lumber, 406 active mills reporting. The United States government has set aside a large area in the State for national forests, among which is Crater Lake National Park, with an area of about 160,000 acres. In addition to the figures given above there were produced on farms in 1909 forest products valued at $2,889,991.

Fisheries. Oregon ranks sixteenth among the States in value of fishery products. The most valuable fishing grounds are those in the Columbia River district, and by far the most important fish is salmon. In 1908 there were engaged in this industry 4769 men, who employed equipment valued at $1,303,000. Boat and shore fishing has almost a monopoly, there being practically no vessel engaged in the industry. The value of the salmon catch in 1908 was $1,301,000. The total value of all fishery products in 1908 was $1,356,000.

Manufactures. The increasing utilization of the large quantities of available water power and the development of the larger rivers for navigation tend to make Oregon of increasing importance as a manufacturing State. In 1909 the gross value of products per capita was $138.

The following table gives the most important figures relative to manufactures in 1909 and 1904.

The most important industry is the manufacture of lumber and timber products, statistics of which will be found in the section on *Forest Products* above. Second in point of value are flour-mill and gristmill products, the principal of these being white wheat flour. The manufacture of butter, cheese, and condensed milk is a comparatively new industry in Oregon. From 1889, when there were only 12 establishments, it grew until in 1909 there were 95 establishments. Canning and preserving is one of the most important and distinctive industries, due to the development of fruit growing and truck gardening and to the salmon fishing grounds in the immediate vicinity. The canning of salmon is the most important branch of the canning industry. In 1909 the State produced 13 per cent of the total output of canned salmon for continental United States. The bean is the principal vegetable canned. Cherries and pears are more extensively canned than any other fruits, although the canning of apples is carried on to some extent.

The total number of wage earners in 1909 was 28,750, of whom 26,480 were males. Wage earners under 16 years of age numbered 98, of whom 74 were males. The prevailing hours of labor for the great majority of wage earners range from 54 to 60 a week.

There are only two cities with a population of over 10,000, Portland and Salem. In 1909, 52.8 per cent of the total value of products were reported from these cities, which together had 44.6 per cent of the wage earners. Portland, the most important manufacturing city, had in 1909 an average of 12,214 wage earners, and the value of its manufactured product was $46,860,767. The most important industries besides lumbering are slaughtering and packing, printing and publishing, foundries and machine shops, leather goods, confectionery, furniture, and the manufacture of men's clothing. In Salem the chief industries are lumber, canning, slaughtering and meat packing, woolen goods, printing and publishing, and malt liquors.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	2,246	34,722	28,750	$89,082	$19,902	$93,005	$42,453
	1904	1,602	22,018	18,523	44,024	11,444	55,525	24,928
Bread and other bakery products	1909	151	905	613	1,609	441	2,829	1,208
	1904	93	618	430	775	221	1,504	629
Butter, cheese, and condensed milk	1909	95	615	420	1,718	290	4,920	968
	1904	98	257	130	429	81	1,629	268
Canning and preserving	1909	71	844	661	4,162	315	3,207	1,020
	1904	48	671	529	1,899	250	2,911	1,017
Flour-mill and gristmill products	1909	114	620	394	5,670	278	8,891	1,224
	1904	105	581	395	3,997	271	8,468	1,116
Foundry and machine-shop products	1909	82	1,270	1,055	3,670	892	3,135	1,663
	1904	42	898	787	1,882	596	1,588	945
Leather goods	1909	48	484	353	824	262	1,629	640
	1904	26	330	270	532	173	925	383
Liquors, malt	1909	18	272	204	2,470	206	1,857	1,403
	1904	24	201	151	2,139	137	1,118	689
Lumber and timber products	1909	713	16,833	15,066	35,031	10,172	30,200	17,787
	1904	477	9,587	8,558	13,103	5,450	15,418	9,562
Printing and publishing	1909	324	2,523	1,459	3,457	1,448	5,041	3,938
	1904	245	1,561	1,018	1,688	724	2,776	2,118
Slaughtering and meat packing	1909	14	493	366	2,481	280	5,880	865
	1904	10	313	246	975	155	2,907	517

Transportation. The Pacific Ocean, Columbia River, and Snake River provide three sides of the State with the advantages of water communication. Large ocean-going vessels pass up the Columbia as far as Portland. Since the construction of a canal at Cascade Locks river steamers can go as far as the Dalles, above which point the stream is again navigable. The Celilo Canal, opened in 1915, makes steamship transportation above the Dalles possible as far as Lewiston, Idaho. The Snake River is navigable below the point where it leaves the Oregon boundary. The Willamette, with the aid of canals, is navigable to Eugene, 150 miles south of Portland. The developed portions of the State are adequately supplied with railroads, but the great arid region east of the Cascades is almost without railroad accommodations save in the northeast, and in the Deschutes valley. The total mileage of first track in 1914 was 2662. The principal steam lines and the mileage operated are the Oregon-Washington Railroad and Navigation Company, 900; the Southern Pacific, 791; the Portland, Eugene, and Eastern, 340; the Oregon Trunk, 156; and the Corvallis and Eastern Railroad, 141; and the Spokane, Portland and Seattle, 135. There were also 323 miles of electric lines. Marshfield, Yaquima, Astoria, and Portland are United States ports of entry and customs districts.

Banks. The constitution of 1857 forbade any banks of issue and also the incorporation of any banks by the Legislature. A private banking business was established in Portland in 1859. The First National Bank of Portland opened in 1865, and is the oldest national bank west of the Rocky Mountains. The banking business is well regulated by law as to deposits and their protection, though the matter of collections is not so well guarded and is subject to some abuse where the law prevents competition. Additional banks are not permitted if the deposits in existing banks do not exceed five times the amount of capital employed in those institutions. The aggregate banking interests remained very insignificant until 1885, when there were only four private and nine national banks. Then came a sudden growth, and in 1894 there were more than 40 banks. The condition of the banks in 1914 is shown in the table on page 552.

Government. The present constitution went into effect on Feb. 14, 1859. The operation of many of the original provisions has been annulled, altered, or enlarged by constitutional amendments and legislation. (See *History* below.) Amendments to the constitution may be proposed in either branch of the Legislative Assembly or by the people, but in order to become effective must be adopted by both Houses and by the electors. A constitutional convention cannot be called unless the law providing for it shall first have been approved by the people in a referendum vote at a regular general election.

Legislative.—The legislative authority is vested in a Legislative Assembly, consisting of a Senate and a House of Representatives. The initiative and referendum have been adopted and are in full force. A referendum may be demanded by the people against one or more items, sections, or parts of any act of the Legislative Assembly as well as against a complete act.

	National banks	State banks	Private banks	Loan and trust companies
Number of banks	84	156	4	5
Capital	$10,586,000	$6,224,000	$150,000	$1,900,000
Surplus	4,754,000	2,079,000	42,000	640,000
Cash, etc.	8,314,000	4,093,000	10,000	936,000
Deposits	59,487,000	39,572,000	872,000	9,992,000
Loans	50,894,000	28,031,000	591,000	7,184,000

The Senate consists of 30, and the House of Representatives of 60 members. Senators are elected for a term of four years, and Representatives for a term of two years. Both Senators and Representatives must be at least 21 years of age, citizens of the United States, and must have resided in the district in which they are chosen for at least one year next preceding the election. Sessions of the Legislature are held biennially, beginning on the second Monday in January following each biennial election.

Executive.—The chief executive power is vested in a Governor, who holds office for four years. No person is eligible to the office for more than eight years in any period of 12 years. The Governor must be at least 30 years of age and must have been a resident of the State for three years preceding the election. Other executive officers are the Secretary of State and the Treasurer. These also hold office for four years and are not eligible for immediate reëlection.

Judiciary.—The judicial power is vested in a supreme court, circuit courts, county courts, and justices of the peace. The supreme court consists of seven justices elected for a term of six years. One of these is the chief justice. Circuit courts are held at least twice a year in each county by a circuit judge. There is elected in each county for a term of six years a county judge. The county courts have limited jurisdiction in civil and criminal matters and perform the function of probate courts. It is provided by law that the most competent of the permanent citizens of the county shall be chosen for jurors. In civil cases three-fourths of the jury may render a verdict.

Suffrage and Elections.—In all elections, except for bonding school districts, every citizen, male and female, of the United States, of the age of 21 years and upwards, who has resided in the State during the six months immediately preceding the election, and all persons of foreign birth of the age of 21 years and upward who have declared their intention to become citizens of the United States, one year preceding such election, are entitled to vote. The regular general biennial election is held on the Tuesday after the first Monday in November in even years. Provision may also be made by law as to expression of first, second, or additional choices among the candidates for office. Every elective public officer is subject to recall by the regular voters of the electoral district in which he was chosen. A petition signed by 25 per cent of the number of electors who vote in the district is necessary for a recall election. There is a corrupt-practice act, and the expenditures of the candidates are limited. All questions submitted to the people for rejection or approval are included in a pamphlet prepared and issued by the Secretary of State. These pamphlets contain also arguments favoring or opposing the measures and are distributed to the voters prior to the election for their study and consideration.

Local and Municipal Government.—The State is divided into counties, which must not have an area of less than 400 square miles. Among the elective county officers are the county judge and two commissioners who levy taxes and conduct the general business of the county. A portion of a county containing at least 150 inhabitants may be incorporated as a town or city, which has the power to govern itself and to revise its own charter. Municipalities may exercise the power of initiative, referendum, and recall. Not more than 10 per cent of the electoral votes is required to order a referendum, or more than 15 per cent to propose any measure by the initiative.

Miscellaneous Constitutional and Statutory Provisions.—The property and pecuniary rights of every married woman at the time of marriage or afterward acquired are not subject to the debts or contracts of her husband. A public commission has wide powers for the regulation of railroad companies and other public utilities in the State. There is a State Board of Forestry. Provision is made for proper sanitation in hotels. There is an eight hour a day law for workmen on public works, and there is also a workmen's compensation act. An industrial welfare commission prescribes minimum wages, maximum hours, and standard conditions for women and minors. Capital punishment was abolished in 1914. The State is under prohibition dating from Jan. 1, 1916, as a result of a constitutional amendment adopted in 1914.

Finances. The constitution prohibits the Legislature from contracting any State debt exceeding $50,000 or assuming the debt of any county, town, or corporation except for purposes of war or to suppress an insurrection. Debts to the amount of $237,000 were contracted in 1864 in order to pay bounties to soldiers and for relief of discharged soldiers and officers. The bonds were rapidly redeemed, and in 1870 only $90,000 were outstanding. In that year the Legislature authorized the issue of $200,000 for construction of a canal, to be redeemed from the proceeds of the sale of public lands. The Indian wars of 1874 and 1878 further increased the debt by about $175,000. Another debt was the "indorsed and unpaid" warrants issued in 1873–75 and bearing 10 per cent for construction of wagon roads and other purposes. These high interest-bearing warrants were necessary because of the constitutional provision against bonds. Altogether about $350,000 of these warrants were issued. By 1878 the public debt amounted to $651,595, but the bonds and warrants were rapidly redeemed through a special tax on property. In 1886 the debt was reduced to $53,632 in bonds and warrants, which were advertised for but not presented for redemption. In 1906 the State had no funded debt except bonds to the amount of $2681, never presented and probably lost. In 1914 the Treasurer's report stated that "the State owes no debt, bonded or otherwise." The income of the State is derived mainly from a State tax and sale of public lands. In the biennium ending September, 1906, the total receipts were $4,706,485, of which 38 per cent came from the State tax and 44 per cent from the sale of lands and payments on old sale contracts and interest on loans. The expenditures were $4,859,333, of which 46 per cent went for educational purposes. In the two years ending Sept. 30, 1914, the receipts were $10,226,773 and the expenditures $10,652,592. Cash on hand, Oct. 1, 1914, $567,917.

Militia. The males of militia age in 1910 numbered 190,553. The organized militia on Jan. 1, 1914, included 1401 enlisted men and 100 officers. It was composed of a regiment of infantry, a battery of field artillery, eight companies of coast artillery, an ambulance company, and a detachment of sanitary troops.

Population. Oregon ranks thirty-fifth among the States in population. The population at each Federal census since 1850 is as follows: 1850, 13,294; 1860, 52,465; 1870, 90,923; 1880, 174,768; 1890, 317,704; 1900, 413,536; 1910, 672,765. The estimated population for 1915 was 809,490. The total native white population numbered 552,089, while the foreign-born white numbered 103,001. There were also 7363 Chinese, 5090 Indians, 3418 Japanese, and 1492 negroes. The foreign-born whites were mainly German and Canadian. Of the native population 40.2 per cent were born in the State. Iowa and Illinois each contributed 5 per cent of those born in other States and Missouri 4.5 per cent. In 1910, 307,060 lived in incorporated places. The average number of persons to the square mile was 7 in 1910. There were 257,188 males, 21 years of age and over. Of the total population 384,265 were males and 288,500 females. There were in 1910 five cities with a population of 8000 or more. These with their population for 1910 and 1914 (est.) are: Portland, 207,214 and 260,601; Salem, 14,094 and 18,286; Astoria, 9599 and 10,117; Eugene, 9009 and 12,083; Medford, 8840 and 12,490.

Education. The general excellence of educational conditions in Oregon is indicated by the fact that in 1910 there were only 10,504 illiterates of 10 years of age or over. This was a percentage of 1.9, a smaller proportion than in any other State except Iowa and Nebraska, the latter of which has the same percentage. The percentage of illiteracy among native-born whites in 1910 was 0.4, among the native whites of foreign or mixed parentage 0.4, among foreign-born whites 6.1, and among negroes 8.8. The total population of school age was 175,386, of which 117,078, or 66.8 per cent, attended school in that year. According to the report of the State Superintendent of Education the total number of persons over four and under 20 years of age in 1914 was 202,389. Of these 137,640 were enrolled in public schools, while the average daily attendance was 115,505. The total number of districts in 1914 was 2427. There were 1101 male teachers and 4650 female teachers. The average monthly salary of the male teachers was $85.59, and of female teachers $62.95. The total expenditure for school purposes was $7,199,471. The school system is administered by a State Superintendent of Public Instruction, who has general supervision, and by the State Board of Education. In 1911 a certification law was passed, and the Legislature of 1913 prepared a measure, which became effective in 1915, providing that persons receiving certificates to teach must have had at least six months' successful teaching experience, or a minimum amount of professional training. There is a State standard for rural and village schools. A useful feature of the educational system is the development of the industrial work of the public schools, including agriculture, home economics, and manual training. Secondary schools are classified as standard four-year high schools, or accredited schools of one, two, or three years. The State schools include the University of Oregon at Eugene, the Oregon Agricultural College at Corvallis, the Oregon Normal School at Monmouth, the Oregon State School for the Blind at Salem, the Oregon State School for the Deaf at Salem, the Oregon State Industrial School at Salem. Other institutions for higher education are Albany College at Albany (Presbyterian), Columbia University at Portland (Roman Catholic), McMinnville College at McMinnville (Baptist), Pacific College at Newburg (Friends), Pacific University at Forest Grove (Congregational), Reed Institute at Portland, and Willamette College at Salem (Methodist Episcopal). These are all coeducational.

Charities and Corrections. The charitable and correction institutions include Oregon State Hospital, the State Sanitarium, the State Institution for the Feeble-Minded, Oregon State Training School, Oregon State Tuberculosis Hospital, Oregon State School for the Blind, Oregon State School for the Deaf, Oregon State Industrial School for Girls, all at Salem, the Eastern Oregon State Hospital at Pendleton, and the Oregon State Soldiers Home at Roseburg. The total expenditures for the support of these schools for the term ending Sept. 30, 1914, was $1,689,733. The Legislature of 1913 created a State Board of Control, consisting of the Governor, Secretary of State, and State Treasurer.

Religion. Somewhat over one-fourth of the total population belong to some of the religious denominations. The leading denominations numerically are the Roman Catholic, Methodist Episcopal, Baptist, Disciples of Christ, Presbyterian, Congregational, Methodist Episcopal (South), and Protestant Episcopal.

History. The accounts of the early exploration of the Pacific coast are conflicting and unreliable. The Spanish explorer Ferrelo possibly reached lat. 42°, the south boundary of Oregon, in 1543, and the English flag was carried 50 or 60 miles north of this point in 1579 by Sir Francis Drake. The Spaniards Vizcaino and Aguilar reached 42° or just beyond in 1603. The fear of a Russian advance led Charles III of Spain to order further explorations, and Pérez in 1774 reached 55° and on his return anchored in what has been identified by some as Nootka Sound. The next year Heceta, with Pérez as second in command, observed the mouth of the Columbia, and a party landed at the modern Port Grenville, where several were killed by the

Indians. One of the ships reached 58°. The English navigator Captain Cook in 1778 landed at Nootka Sound (on Vancouver Island), which he so named. This English claim to possession was disputed by the Spaniards in 1789, but Spain was forced to agree to give up exclusive claim. (See Nootka Sound.) The French navigator La Pérouse in 1786 sailed along the coast from 58° 37′ southward. The American claim began with the visit of J. Kendrick and Robert Gray, sent out by Boston merchants to seek for furs. The winter of 1788–89 was spent at Nootka. In 1791 Captain Gray returned, and on May 11, 1792, entered the mouth of the river St. Roque, which he renamed the Columbia, from his ship. Another English expedition under Vancouver examined the coast in 1793. Fur traders entered the country in 1793, and in 1811 the Pacific Fur Company founded Astoria at the mouth of the Columbia. (See Astor, John Jacob.) This was captured by the British, Dec. 12, 1813, and renamed Fort George. It was restored to the United States in 1818, but abandoned by the owners. In 1824–25 Fort Vancouver was founded by John McLaughlin, chief factor of the United Hudson's Bay and Northwest Fur Companies, and he was practically Governor for many years.

The American claim rested upon the Louisiana Purchase in 1803 (the Spanish claim) and the discoveries of Captain Gray in 1792. From these grew the claim to all country drained by the Columbia. In 1805–06 Lewis and Clark explored much of the country. The northwest boundary between the United States and Canada was fixed by the Convention of 1818 as the line of 49° from the Lake of the Woods to the Rocky Mountains. West of this point the territory was to be open to both parties, the United States and Canada, for 10 years without prejudice to claims of either. (See Northwest Boundary Dispute.) By the Convention of 1827, ratified in 1828, joint occupation was continued indefinitely, but might be terminated by either party on 12 months' notice. The British were willing to concede 49° to the Columbia River, thence down it to the mouth, thus taking in the greater part of the present State of Washington, while the American claim, as before stated, was for all of the basin of the Columbia River, practically 42°–52°. The Oregon question occupied much of the attention of Congress after 1820, and the sentiment for demanding "all of Oregon" grew. By the negotiations with Russia (1824–25) that country agreed to make no settlements south of 54° 40′, and the idea gained ground that this was the proper northern boundary. Immigration to the territory had begun in 1832; the Methodists founded a mission under Jason Lee in 1834, and the Presbyterians under Marcus Whitman in 1836. Every year after 1838 numbers of immigrants crossed the Rockies, and by 1845 the American population numbered nearly 3000. The settlement of the northeast boundary had been unsatisfactory, and in 1844 a popular rallying cry of the Democrats was "Fifty-four forty, or fight." Several Senators favored war, but others held that the best method of gaining possession was by actual settlement, in which the Americans were far surpassing the British, who were hardly represented except by the trappers of the Hudson's Bay Company. It was finally agreed in 1846 that the boundary should be 49° to the channel between Vancouver and the mainland, thence down the middle of this channel, through the Straits of San Juan de Fuca to the sea. The story that Marcus Whitman (q.v.) in 1843 prevented the exchange of the northern part of the territory for fishing stations in Newfoundland is now believed to be unfounded.

The American inhabitants in 1843 met and organized a Territorial government under an executive council. A Governor was chosen in 1845 and served until the organization of the region as a Territory of the United States. Oregon Territory, including the present Washington and much of Idaho, was organized on Aug. 14, 1848, though the Governor did not arrive until the next year. The increase of population caused the inhabitants to hold a convention at Salem, August–September, 1857, which formed a State constitution and asked for admission. This instrument prohibited slavery, but forbade any free negro or mulatto "to come, reside, or be in the State, or hold real estate, or make any contract, or maintain any suit." The State was admitted Feb. 14, 1859, with the present boundaries. Indian troubles were frequent from early times. In 1847 Whitman and 12 companions were massacred. There was constant trouble during the Civil War, and the Shoshone War (1866–68) and the Modoc War (1864–73) were serious. (See Modoc.) All Indians are now confined within narrow reservations or have been removed to Indian Territory. The "anti-negro" clause still stands, though, of course, inoperative. The State has been successful in securing large appropriations for improvement of rivers and harbors from the national government. The Cascade Locks on the Columbia were the largest in the world when completed in 1896. The State has given its electoral vote for the Republican ticket except in 1868, and one vote in 1892, though usually by small majorities.

In the beginning of the twentieth century Oregon was a pioneer in the employment of those devices of government which have since been adopted by several of the other States. These include direct nominations, the initiative, referendum, and recall, and similar provisions. As early as 1901 the people voted for candidates for the United States Senate, but the Legislative Assembly was not bound to carry out the decision of the popular vote. A constitutional provision for the initiative and referendum adopted in 1902 was made effective by a legislative act of 1903, and this power of the initiative was first exercised in the following year when the people proposed and enacted a local-option liquor law and a direct-primary law. Since 1904 United States Senators have been chosen by a popular vote. Candidates for the State Legislature between the years 1906 and 1913 were permitted to specify whether they would or would not support the people's choice for United States Senators regardless of their own preferences. In the general election held in June, 1908, George E. Chamberlain, Democrat and at the time Governor of the State, received a plurality of the votes for United States Senator. In the same election a Republican Legislature was elected. In accordance with the provisions noted above a majority of the members of this Legislature were required by their pledges to vote for the candidate for United States Senator receiving the highest number of votes. Thus the situation was brought about that a Republican Legislature was pledged to elect a Democratic Senator. This the Legislature did in January, 1909. In the presidential election of 1908 Taft received

62,530 votes, Bryan 38,049, and Debs 7339. F. W. Benson, Secretary of State, succeeded Governor Chamberlain on the latter's election to the Senate. In the election of 1910 Oswald West, Democrat, was elected Governor. A presidential primary bill was adopted at this election. The first presidential primary was held on April 19, 1912, in which Roosevelt received a plurality of the votes. In the presidential election on November 5, Wilson received 47,064 votes, Roosevelt 37,600, Taft 34,673, and Debs 13,329. In 1914 the Republicans nominated James Withycombe for Governor, and the Democrats C. J. Smith. For the United States Senate Senator Chamberlain was renominated. In November the Republicans elected their candidate for Governor, but Senator Chamberlain was reelected. In this election constitutional amendments providing for prohibition and abolishing capital punishment were adopted. The following have been Governors of the State:

PROVISIONAL

George Abernethy	1845–49

TERRITORIAL

Joseph Lane	1849–50
Knitzing Pritchett (acting)	1850
John P. Gaines	1850–52
Joseph Lane	1853
George L. Curry	1853
John W. Davis	1853–54
George L. Curry	1854–59

STATE

John Whiteaker	Democrat	1859–62
Addison C. Gibbs	Republican	1862–66
George L. Woods	"	1866–70
Lafayette Grover	Democrat	1870–77
S. F. Chadwick (acting)	"	1877–78
William W. Thayer	"	1878–82
Zenas F. Moody	Republican	1882–87
Sylvester Pennoyer	Democrat-Populist	1887–95
William P. Lord	Republican	1895–99
Theodor T. Geer	"	1899–1903
George E. Chamberlain	Democrat	1903–1909
Frank W. Benson	Republican	1909–11
Oswald West	Democrat	1911–15
James Withycombe	Republican	1915–

Bibliography. Greenhow, *History of Oregon and California* (Boston, 1844); Nicolay, *Oregon Territory* (London, 1846), a clear statement of the British position; Gray, *History of Oregon 1792–1849* (Portland, Oreg., 1870); Bancroft, *History of the Northwest Coast* (San Francisco, 1884); Barrows, *Oregon, the Struggle for Possession* (Boston, 1884); Bancroft, *History of Oregon* (San Francisco, 1886–88); Nixon, *How Marcus Whitman Saved Oregon* (Chicago, 1895); Mowry, *Marcus Whitman and the Early Days of Oregon* (New York, 1901); Bourne, "The Whitman Legend," in *American Historical Review* (ib., 1901); Johnson, *Short History of Oregon* (Chicago, 1904); Cole, *Early Oregon: Recollections of a Pioneer of 1850* (Spokane, 1905); Clarke, *Pioneer Days of Oregon History* (2 vols., Portland, 1905).

OREGON. A city and the county seat of Ogle Co., Ill., 99 miles west of Chicago, on the Rock River and on the Chicago, Burlington, and Quincy Railroad (Map: Illinois, F 1). It has a public library. Good water power is furnished by the river, and there are manufactures of pianos, street sprinklers, silica products, foundry and machine-shop products, etc. Oregon is an attractive summer resort. The water works are owned by the city. Pop., 1900, 1577; 1910, 2180.

OREGON, UNIVERSITY OF. A coeducational institution for higher education founded at Eugene in 1872 and opened for instruction in 1876. The university forms an integral part of the public-school system of the State. It comprises the school of literature, science, and arts, school of commerce, school of education, school of journalism, school of law, school of architecture and fine arts, school of music, school of medicine, and the graduate school, where two years of college work is required for admission. Admission to the freshman year of the university is based on high-school graduation or its equivalent, covering not less than 15 units of work. The total enrollment in 1914–15 was 1560 students, the instructors numbering 156. The university is supported chiefly by State appropriations, the annual income being about $300,000. The library contains about 60,000 volumes. The president in 1915 was Prince L. Campbell.

OREGON AGRICULTURAL COLLEGE. A State institution for higher education founded at Corvallis, Oreg., in 1885. The plant includes 15 substantial buildings of brick and stone, with five additional frame buildings. There are in addition two large dormitories for women. The college comprises six schools of instruction: agriculture, forestry, home economics, engineering, mines, commerce. These schools have 26 subdivisions offering degrees. The total enrollment in all courses in 1914–15 was 4158. Of these, 2598 were men and 1560 were women. In the summer and winter short courses 2535 were enrolled and in the regular 36-week courses 1623. The revenue is derived chiefly from the State and from the proceeds of sale of lands. The total annual income is about $720,000. The library contains about 30,000 volumes. The president in 1915 was William Jasper Kerr, Sc.D.

OREGON BROOK TROUT. The common brook trout of the tributaries of the lower Columbia and of coastwise streams of Oregon and Washington, a variety (*masoni*) of the rainbow trout (q.v.). The Dolly Varden trout of the same region is sometimes called the Oregon charr.

OREGON CITY. The county seat of Clackamas Co., Oreg., 15 miles by rail south-southeast of Portland, on the Willamette River and on the lines of the Portland Railway Light and Power Company and the Southern Pacific Railroad (Map: Oregon, C 2). It is developing as an industrial centre, its manufactures, which include paper and pulp, woolen goods, flour, lumber, soap, etc., being promoted by the immense water power derived from the falls of the Willamette, 40 feet in height, which are utilized also as a source of electrical power. The city is at the head of deep-water navigation on the river, but vessels pass above the falls by means of a system of locks. Noteworthy features include the Carnegie library, city hospital, parks, and high schools. There are municipal water works. Pop., 1900, 3494; 1910, 4287.

OREGON QUESTION. The name given in American history to the dispute between the United States and Great Britain over the delimitation of their possessions on the northwest coast, leading to the determination of the present boundary. See NORTHWEST BOUNDARY DISPUTE; OREGON, *History*.

OREGON RIVER. A river in North America. See COLUMBIA RIVER.

OREGON ROBIN. A thrush (*Merula nævia* or *Ixoreus nævius*) of the Columbia River valley and northward, which is closely related to the Eastern robin (*Merula migratoria*). but very different in colors. The varied thrush, as it is often called, is dark bluish slate above and orange brown below, with a line of black from the bill backward below the eye and along the side of the neck, whence it curves forward into a broad, crescentic band across the breast. The bird breeds in British Columbia and Alaska, makes a strong nest in bushes, and lays eggs colored light greenish blue and distinctly marked and spotted with blackish brown. It has a sweet song.

OREGON SNOWBIRD. A junco (*Junco hyemalis oreganus*) common in the northwestern United States and Canada. It differs from the common Eastern junco (q.v.) in the blacker and more sharply defined hue of the head and neck, the absence of dark color under the wings, and the square patch of rufous brown on the upper part of the back. As in other juncos, white feathers appear in the tail. The male of this species has the second tail feather mostly white and the third partly so near the tip. The adult female's plumage differs from that of the male in being prevailingly brown.

OREGON STURGEON. The white sturgeon of the Pacific coast of North America. See STURGEON.

OREGON TRAIL. An emigrant route, about 2000 miles in length, from Independence, Mo., to the Columbia River. For 41 miles it followed the Santa Fe trail, leading up the Platte to Fort Laramie, thence to South Pass by the Sweetwater, across Green River, up Black River by Muddy Creek to a pass into the Bear River valley, and thence to Port Neuf River and Fort Hall on the Snake. Following Snake River, below Salmon Falls it cut across to Fort Boise and on to Burnt River, then turned off to the upper Powder River, went over the divide of the Blue Mountains and down the Umatilla to the Columbia.

Originally, like many of the main roads of the country, it was made in some parts by the Indians and trappers. A part of it was blazed by Vérendrye in 1742, and the expedition of Lewis and Clark in 1804 made more of it known. In 1810 Astor, in establishing his trading posts, dispatched a party overland under W. P. Hunt to follow in the trail of these explorers. This party, returning in 1812 under Robert Stuart, missed the headwaters of the Missouri and, following the Plate, established another link of what became the accepted trail. S. H. Long in 1820 and W. H. Ashley in 1823 made expeditions over other parts of it. In 1826 Smith, Jackson, and Sublette carried on trade over its route, and four years later Sublette guided the first wagon train over it. Bonneville in 1832 led a band of trappers and traders from Missouri, and about the same time Nathaniel J. Wyeth made the first continuous overland trip on record, leaving Boston in April and reaching Vancouver in October. In 1834 Methodist missionaries under Jason and Daniel Lee were sent out to establish a mission in Oregon. Two years later came Marcus Whitman and other missionaries with their wives. Presbyterian missionaries followed in this same year, and Catholics in 1839. In 1842 Frémont made his expedition and under government authority surveyed a practical route to the Pacific coast.

It is estimated that 137 emigrants passed over the trail in 1842, 875 in 1843, 1475 in 1844, 3000 in 1845, and 1500 in 1846, when ended the long-contested Oregon question. Earlier the Mormon migration followed the trail to the bend of the Bear River, and later the discovery of gold in California drew thousands over the same route as far as Fort Hall. Largely through the efforts of the Daughters of the American Revolution the trail is being appropriately marked.

The most authentic map of the trail is that issued by the United States in 1848, based upon surveys of Frémont and other authorities and drawn by Charles Preuss. Other excellent maps are in the "American Nation Series," xiv and xvii. Consult also: J. C. Frémont, *Expedition to the Rocky Mountains* (Buffalo, 1850); Francis Parkman, *The Oregon Trail* (Boston, 1872); H. H. Bancroft, *Oregon* (San Francisco, 1890); *Correspondence and Journal of Captain Nathaniel J. Wyeth* (Eugene, Oreg., 1899); E. C. Semple, *American History and its Geographic Conditions* (Boston, 1903).

OREGON TRAIL, THE. A narrative of travel by Francis Parkman (1849). It is the account of a trip to the Far West which he made in 1846, and first appeared in the *Knickerbocker Magazine* in 1849 as "The California and Oregon Trail."

OREIDE. See OROIDE.

O'REILLY, COUNT ALEXANDER (c.1722–1794). An Irish soldier in the Spanish service. At an early age he went to Spain, where he entered the military service. After serving in Italy against the Austrians he entered their service in 1757 and fought in two campaigns against the Prussians. In 1759 he entered the French army, but soon afterward was induced to return to Spain, and in the campaign of 1762 against Portugal earned promotion to the rank of brigadier general. He was made major general, and was appointed Governor of Havana. There he rebuilt the fortifications which had been demolished by the British. In 1769, appointed Governor of Louisiana and sent with a large force to reduce the rebellious French colonists, he arrested and tried the leaders of the revolution and had some of them shot, but having thus demonstrated his master's power, he then devoted himself to winning the affections of the colonists by the affability of his demeanor and the liberality of his policy. In 1770 he returned to Spain, where he was made Governor of Madrid. On the death of General Ricardos he was appointed commander of one of the armies operating against the French in 1793, and died while on his way to the frontier.

O'REILLY, CHARLES (1846–). A Canadian physician. He was born at Hamilton, Ontario, and was educated in that city and in medicine at McGill University, Montreal. He was resident physician of the Hamilton City Hospital in 1867–75, and in the latter year was appointed medical superintendent of the Toronto General Hospital, a position which he filled until 1905. Many improvements in hospital administration were effected during his term of office. Largely through his efforts the ambulance service was established in Canada, and during the Northwest rebellion headed by Louis Riel (q.v.) in 1885 O'Reilly organized and sent to the front the Toronto General Hospital Ambulance Corps.

O'REILLY, JOHN BOYLE (1844–90). An Irish-American poet and journalist, born at Dowth Castle, County Meath, Ireland, June 28, 1844. He studied at a private school, learned to set type, and became a newspaper reporter.

At the age of 18 he went to London as an agent of the Fenian Society, and in 1865 enlisted in the British army for the purpose of inducing Irish soldiers to revolt. He was detected in 1866, tried for high treason, and sentenced to be shot, but the sentence was commuted to penal servitude for 20 years. On Feb. 18, 1869, with the help of the Rev. Patrick McCabe, he escaped in a boat from Bunbury, Western Australia, was rescued by the *Gazelle*, an American whaler, and carried to the United States in November, 1869. He settled in Boston and devoted himself to literary work and public activity. In 1870 he became editor of the *Pilot* and remained in that position till his death at Hull, Mass., Aug. 10, 1890. He was the founder of the Papyrus Club of Boston, and was highly esteemed, especially by men of his own race, for his talents, social qualities, and his loyalty to the Fenians. His verse includes *Songs of the Southern Seas and Other Poems* (1873); *Songs, Legends, and Ballads* (1878); *Statues in the Block and Other Poems* (1881); *America* (1882); *In Bohemia* (1886). Volumes of prose are: *Moondyne: A Story from the Under World* (1879), a tale of penal life; *The Irish Question* (1886); *The Ethics of Boxing and Manly Sport* (1888); *Stories and Sketches* (1888). Consult J. J. Roche, *Life of John Boyle O'Reilly* (Boston, 1891).

O'REILLY, Miles. See Halpine, or Halpin, Charles Graham.

O'REILLY, Robert Maitland (1845–1912). An American surgeon, born in Philadelphia. He graduated M.D. from the University of Pennsylvania in 1866, having from 1863 served in the Civil War as a medical cadet. In 1867 he was commissioned assistant surgeon of the United States army and in 1902 was appointed surgeon general, retiring in 1909 with the rank of major general. He took part in the expeditions against the Sioux in 1874 and 1891. While on duty in Washington in 1884 he was assigned to the White House as personal physician to President Cleveland, and during the Spanish-American War was chief surgeon of the Fourth Army Corps at Tampa, Fla. During his term as surgeon general the reorganization of the medical corps of the army took place, the office of contract surgeon was abolished, and the medical reserve corps was established. O'Reilly favored the introduction of antityphoid vaccination in the army.

OREJONE, ŏ'râ-hŏ'nå (Sp., big ear). A name applied by the Spaniards to several unrelated tribes on account of their custom of stretching or distending the ear by heavy pendants. The principal tribe thus known, properly called Coto, ranges between the Putumayo and Napo rivers, in territory claimed both by Ecuador and Colombia. They are naked savages of repulsive appearance and fierce disposition, although carrying on some trade in hammocks and poison. Their huts are without doors, entrance being effected from the roof. They use stone hatchets and poisoned arrows, and stretch their ears, by the insertion of wooden plugs in the lobes, until they hang down to their shoulders. Their language is said to be related to the Ticuna.

Another tribe of the same name was described by the missionary Nicolas in 1739 as living in the ancient Province of Santa Marta, now the province of Magdalena, Colombia. They called themselves Tomoco. They were also fierce and brutal savages, going entirely naked, with bodies anointed with gum, and their long hair hanging loosely, sometimes crowned with feather turbans. Both men and women wore gold pendants in their ears and noses. They cultivated corn, but depended chiefly upon hunting for subsistence. They were also accused of cannibalism. They were bitterly hostile to the Spaniards, very few of them having ever been brought under mission influence, and have probably long since disappeared. Consult: E. Poeppig, *Reise in Chile und Peru*, vol. ii (Leipzig, 1836); D. G. Brinton, *The American Race* (New York, 1891).

OREL, ŏr-yôl'. A government of central Russia consisting of 12 districts and bounded by the governments of Smolensk, Kaluga, and Tula on the north, Voronezh on the east, Voronezh and Kursk on the south, and Tchernigov on the west (Map: Russia, E 4). Area, 18,042 square miles. It has a somewhat hilly surface intersected by numerous ravines and river valleys and sloping generally towards the west. The chief rivers are the Don (with its tributary the Sosna), the Oka, and the Desna. The climate is moderate, the temperature averaging 45° F. at Orel, the capital. In the eastern part, where there is an abundance of black soil, agriculture is the principal occupation and yields considerable quantities of grain for export and hemp for manufacturing. In the west the soil is generally sandy and sterile and agriculture is only of secondary importance. Thousands of the peasants of that section migrate annually for a season of work to St. Petersburg and Moscow and especially to the southern parts of Russia. Stock raising is important and the Orel horses are classed among the best in Russia. In the forest regions timber, tar, and pitch are produced. The house industry is but slightly developed. The chief manufactures are iron rails, glass, oil, flour, hemp products, etc. Pop., 1913, 2,719,100, chiefly Great Russians.

OREL. The capital of the government of the same name in central Russia, situated on the Oka, at its confluence with the Orlik, 238 miles south of Moscow, and at the junction of three railway lines (Map: Russia, E 4). It is built mostly of wood. It contains three Gymnasia, a Realschule, a corps of cadets, a theological seminary, and a meteorological station. It is the see of a bishop and has several important cathedrals, including those of St. Peter and St. Paul. The chief products are candles, ropes, oil, and flour. The town was founded in 1564 as a frontier fortress against the Crimean Tatars. Pop., 1904, 81,641; 1910, 91,051.

OREL, ŏ'rĕl, Anton (1881–). An Austrian reformer, born and educated in Vienna. About 1899 he went into the Christian labor movement, in 1903 became prominent in temperance reform, in 1905 founded the Christliche Jugendbewegung, and edited the periodicals *Arbeiterjugend* (1906), *Unsere Jugend* (1909 et seq.), and *Neues Leben* (1910 et seq.), and a series called *Jugendbewegung*. After 1909 he was a leader of the Christian Socialists. Orel wrote: *Der Alkoholismus* (2d ed., 1908); *Kapitalismus, Bodenreform, und christlicher Sozialismus* (1909); *Geschichte der christlichen Jugendbewegung* (1910–11).

O'RELL', Max (the name assumed by Paul Blouet, 1848–1903). A French satirist, born in England. He fought for France in the Franco-German War (1870), returned to England as a newspaper correspondent in 1872, and taught at St. Paul's School (1876–84) and in the University of London. His experiences of this period and during a visit to the United States provided material for *John Bull and his Island* (1883); *John Bull's Daughters* (1884); *Friend MacDonald* (1887); *Jonathan and his Continent* (1889); *A Frenchman in America* (1891); *English Pharisees and French Crocodiles* (1892); *John Bull and Co.* (1894); and similar books that have had a wider circulation among English peoples than in France. His writings, first published in French and translated into English by his wife, are humorous and often truthful, but as studies of nations they are marked by no very careful investigation or depth of thought. O'Rell published also *Femme et artiste* (1900), a "modern romance," and *Sa Majesté l'Amour* (1901); and after his death appeared (1904) *Confidentiel.*

ORELLANA, ŏ′râ-lyä′nȧ, FRANCISCO DE (c.1490–?1545 or ?1549). The discoverer of the course of the Amazon River. He was born in Trujillo, Spain, and went to Peru in 1535. In 1537 he had a share in the founding of Guayaquil. In 1540 he accompanied Gonzalo Pizarro as second in command on an expedition across the Andes into the country beyond, which was reported to abound in gold, silver, and cinnamon. After many hardships and misfortunes the expedition reached the junction of the Coca and Napo rivers. Their supplies being exhausted, Orellana with 50 men was ordered to sail down the Napo in search of provisions and signs of treasure. He descended the stream to its junction with the Amazon, but instead of returning proceeded down the great river in a vessel which he constructed for the purpose. The voyage to the mouth of the Amazon lasted nearly eight months and Orellana's party underwent severe privations. Many deaths occurred from skirmishes with the natives, and mutinies broke out among the crew, which only the commander's firmness quelled. Orellana reached the coast in August, 1541. From the mouth of the river he sailed to the island of Cubagua, in Venezuela, and thence to Spain, carrying glowing accounts of El Dorado and embellishing his story with descriptions of a marvelous race of female warriors of whom the natives, as he understood them, had told him, and who were named from the classical analogy Amazons. Gold there was in such plenty that the roofs of the temples were made of that metal. The King of Spain granted Orellana extensive possessions and a commission to colonize El Dorado. He set out with four ships and 400 men in May, 1544, but lost one ship and 150 men before reaching Teneriffe. He arrived at the mouth of the Amazon, but his fleet was wrecked, and he died shortly after of malarial fever. An account of Orellana's first voyage was written by Gaspar de Carvajal. Consult *The Voyage of Francisco de Orellana down the River of the Amazons,* translated by C. R. Markham from Antonio de Herrera's *Historia general de las Indias occidentales* and published by the Hakluyt Society in its *Publications,* vol. xxiv (London, 1859).

ORELLI, ô-rĕl′lē, JOHANN KASPAR VON (1787–1849). A Swiss classical scholar, born at Zurich. He studied in the Carolinum at Zurich and in 1806 was ordained as a clergyman. He spent some years as a pastor at Bergamo; while at Bergamo he published, in 1810, two parts of a work entitled *Beiträge zur Geschichte der italienischen Poesie.* In 1814 he became a teacher in the cantonal school at Chur, in 1819 professor of eloquence and hermeneutics in Zurich, and after the foundation of the Zurich High School, in which he took an active part, he was one of its chief instructors. Orelli edited many classical authors with great learning, taste, and acute discrimination. In particular, his editions of Horace (Zurich, 1837–38), Tacitus (ib., 1846–47), and Cicero, text (ib., 1826–31), deserve mention; also an *Onomasticon Tullianum* (ib., 1836–38), executed in association with Baiter, and an *Inscriptionum Latinarum Selectarum Collectio* (2 vols., ib., 1828; 3d vol. with indexes, by Henzen, ib., 1856). There is a fourth edition of Orelli's *Horace,* with a lexicon (Berlin, 1886–92). Consult: Conrad Orelli, in *Neujahrsblatt der Stadtbibliothek Zurich* (Zurich, 1851); H. Schweizlev-Sidler, *Gedächtnissrede auf Johann Caspar Orelli* (ib., 1874); J. E. Sandys, *A History of Classical Scholarship,* vol. iii (Cambridge, 1908).

ORENBURG, ŏr′ĕn-bụrk′. A government of Russia partly in Europe and partly in Asia, consisting of five districts and bounded by the Government of Perm on the north, Tobolsk and Turgai on the east, Uralsk on the south, and Samara and Ufa on the west (Map: Russia, J 4). Area, about 73,254 square miles. It is mountainous in the centre and the north, being traversed by the Ural Mountains (q.v.) and their offshoots. It slopes towards the west, south, and east. The eastern and southern parts have the character of a steppe. The region belongs mainly to the basins of the Ural and Tobol. Lakes are very numerous and some of them contain extensive deposits of salt.

The climate is healthful, but somewhat dry in the southeast. The average annual temperature at Orenburg, the capital, is 38.5° F. Orenburg is noted for its mineral deposits, which include gold, silver, copper, iron, platinum, and salt. Coal has also been discovered near Iletsk in the south. Gold, copper, iron, and salt are obtained on a large scale, the first being found mainly in the eastern slopes of the Ural chain. The mountainous region in the centre is well wooded, while the eastern steppe is mostly barren. The natural conditions are favorable for agriculture, but the soil has been to some extent exhausted by the wasteful methods which usually characterize agriculture in new countries. About three-sevenths of the total area of the district belongs to the Orenburg Cossacks, the original Russian settlers of the region, who are still maintained on a military basis and are very prosperous.

Stock raising is extensive, especially among the Bashkirs. Animals and animal products are among the leading exports. The Bashkirs are particularly known for their kumiss, which forms an essential item in their diet. Manufacturing industries are as yet undeveloped. The best-known products of the house industry are various felt products and the Orenburg shawls, prepared from goats' wool and largely exported. There is an extensive trade carried on with the Kirghiz of the steppes. Pop., 1913, 2,147,600, only about 70 per cent Russians. The remainder are Bashkirs and other Mohammedans.

ORENBURG. The capital of the government of Orenburg, in east Russia, on the right bank of the Ural, 988 miles by rail southeast of Moscow (Map: Russia, J 4). It is a well-built city with an old fortress, an arsenal, two Gymnasia, a corps of cadets, a seminary for priests and for teachers, a theatre, and a museum. In the extensive municipal abattoir great numbers of cattle are slaughtered annually for export purposes. A little over a mile from the city is the barter house, an extensive bazaar in the shape of a fortress, where herds of cattle brought from the East are exchanged for manufactured articles. The barter trade, which was formerly very extensive, has decreased considerably since the construction of the Trans-Caspian Railway. Orenburg exports large quantities of frozen meat, tallow, hides and skins, butter, cheese, wool, and other animal products. The town was founded at the confluence of the Or and the Ural in 1735. It was removed to its present site in 1742. It withstood a siege by Pugatchev in 1773. Pop., 1904, 86,796; 1910, 93,600, including Russians, Tatars, Jews, and Kirghiz.

OREN′DA. See WAKONDA.

ORENSE, ō-rĕn′sȧ (Lat. *Aquæ Urentes*, hot springs). The capital of the Province of Orense in Galicia, northwest Spain (Map: Spain, B 1). It is situated on the left bank of the Miño, in a mountain valley having a cloudy and stormy climate. The river is here crossed by a fine bridge of seven arches built in 1230, and the town itself has a few mediæval houses of interest, as well as a small Gothic cathedral, which is hemmed in by houses and narrow streets. The high school occupies a handsome building, and there are, besides, a seminary, a normal school, the provincial library, and a theatre. The town manufactures leather and chocolate, and there are flour mills and iron foundries. At the foot of the hill on which the town lies are the hot springs of Las Burgas. Pop., 1887, 14,168; 1900, 15,258; 1910, 15,998.

O′REODAPH′NE (Neo-Lat., from Gk. *ὄρος*, *oros*, mountain + *δάφνη*, *daphnē*, laurel). A genus of trees (now called *Ocotea*) of the family Lauraceæ, sometimes called mountain laurel. The fruit is succulent, partly immersed in the deep thick calyx. *Ocotea opifera* is a native of the lower Amazon countries. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor. *Ocotea cupularis* (*Mespilodaphne cupularis* of some botanists) is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Réunion and Madagascar. *Ocotea fœtens*, a native of the Canaries, has wood (til wood) of a most disagreeable odor. *Ocotea bullata*, found at the Cape of Good Hope, is also similarly remarkable and is locally called stinkwood. It is hard, durable, beautiful, takes an excellent polish, and is used in shipbuilding.

O′REODON (Neo-Lat., from Gk. *ὄρος*, *oros*, mountain + *ὀδούς*, *odous*, tooth). An extinct artiodactyl ungulate mammal, fossil remains of which are found in such great abundance in the Oreodon beds as to indicate that these animals roamed in extensive herds over the grassy plains of Colorado, the Dakotas, Nebraska, and Wyoming during Miocene times. The animal was of the size of the modern peccary, with four hoofed toes on each foot and a very long slender tail. Leidy called it a ruminating hog. An allied genus, *Eporeodon*, twice the size of *Oreodon*, is found in the Miocene deposits of the Pacific coast, and other ancestral forms are found in the Eocene beds.

ORE SAMPLING. See ASSAYING.

ORESTES, ō-rĕs′tēz (Lat., from Gk. *Ὀρέστης*). In Greek legend, a son of Agamemnon and Clytemnestra. According to the *Odyssey*, iii, 360; xi, 542, he was sent from Mycenæ by his mother when she yielded to the seductions of Ægisthus. Brought up at Athens, he returned eight years after the murder of his father by Ægisthus, slew the murderer, and recovered the kingdom. The death of Clytemnestra is implied, but there is no allusion to her murder by her son. In the later poets, apparently through the influence of Stesichorus, this became the prominent feature of the story, which was then closely connected with the worship of the Delphian Apollo as a purifier from the guilt of blood. The theme was treated by the three great tragedians—by Æschylus (q.v.) in the Orestean trilogy, by Sophocles (q.v.) in the *Electra*, by Euripides in the *Electra*, *Orestes*, and *Iphigenia among the Taurians*. The versions vary in the details according to the dramatic ideas which influenced the writers. After the murder of Agamemnon, Ægisthus and Clytemnestra ruled over Mycenæ, or Argos, without opposition. Electra (q.v.), sister of Orestes, was harshly treated because she still mourned her father and longed for vengeance on his murderers. Orestes tarried in Phocis, hesitating to return until ordered by Apollo to avenge his father. He therefore went to the palace of Clytemnestra, revealed himself to Electra, by a stratagem secured admission, and slew his mother, Clytemnestra, and her paramour. He then sought purification at Delphi, and in one version found it. Another story told how the Erinnyes (or Furies) pursued the matricide, and even Apollo could not help him, but sent him to Athens, where Athena established the high court of the Areopagus (q.v.) to hear the case. Orestes was acquitted by a tie vote, and the Furies were appeased by the establishment of their worship as the Eumenides at Athens. Euripides added the story that after the trial Orestes was freed only by voyaging to the Tauric Chersonese for the image of Artemis, thus freeing his sister Iphigenia (q.v.). The *Orestes* of Euripides has a unique version of a trial at Argos and condemnation. After his release from the Furies Orestes reigned at Argos or Sparta, and married Hermione, daughter of Menelaus, after killing at Delphi Neoptolemus, son of Achilles, who also claimed her hand. Scenes from this legend are common on vases and sarcophagi. Consult annotated editions of the Greek plays named above, especially R. C. Jebb's edition of the *Electra* of Sophocles (Cambridge, 1908); T. Zielinski, "Die Orestessage und die Rechtfertigungsides," in *Neue Jahrbücher für das klassische Altertum*, vol. ii (Leipzig, 1899); the article "Orestes" in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (ib., 1897–1909); Gilbert Murray, *Hamlet and Orestes: A Study in Traditional Types* (Oxford, 1914).

O′REUS (Lat., from Gk. *Ὠρεύς*). A later name for the ancient Eubœan city Histiæa (q.v.).

ORFA, ôr-fä′. See EDESSA.

OR′FE (from Lat. *orphus*, from Gk. *ὀρφός*, *orphos*, sort of perch). A golden variety of the ide, bred for keeping in aquariums. See IDE.

ORFEO ED EURIDICE, ôr-fā′ō ĕd ā′ụ-rē-dē′chȧ. An opera by Gluck (q.v.), first produced in Vienna, Oct. 5, 1762; in the United States in 1866 (New York).

ORFILA, ôr′fē′lȧ′, MATTHIEU JOSEPH BONAVENTURE (1787–1853). A French chemist, physician, and toxicologist. He was born at Mahon in Minorca and studied medicine at Valencia, Barcelona, and Paris, receiving the degree of doctor of medicine in 1811. He immediately began a private course of lectures on chemistry, botany, and anatomy, and soon became a well-known and successful practitioner. In 1813 he published a treatise on poisons which materially increased his fame; in 1816 he became court physician; in 1818 he was naturalized a citizen of France and in 1819 became professor of medical jurisprudence; in 1823 he was transferred to the chair of chemistry, to which was added in 1831 the deanship of the faculty; and in 1851 he was elected president of the Academy of Medicine. From 1834 he was a member of the council of public instruction. He organized a clinical hospital and founded a new botanical garden and a museum of comparative anatomy now known by his name. He died in Paris. Orfila is regarded as the founder of the science of toxicology, and his great work on the subject, *Traité des poisons tirés du regne minéral, végétal et animal ou toxicologie générale* (1813; 5th ed., 1852; translated into many languages; Eng. trans., *A General System of Toxicology,* 1817), gained him world-wide recognition. His other works are: *Eléments de chimie médicale* (1817; 8th ed., 1851; the later editions appeared as *Eléments de chimie appliqués à la médicine et aux arts*); *Secour à donner aux personnes empoisonnées ou asphyxiées* (1818; 3d ed., 1825; Eng. trans., *A Popular Treatise on the Remedies in Cases of Poisoning and Apparent Death,* 1818; Amer. ed., *A Practical Treatise on Poisons and Asphyxies,* 1826); *Leçons de médicine légale* (1821–23; 4th ed., 1847, *Traité de médicine légale*); *Mémoires sur plusieurs questions médico-légales* (1839); *Recherches médico-légales et thérapeutiques sur l'empoisonnement par l'acide arsénieux* (1842).

OR'FORD, Sir Robert Walpole, first Earl of. An English statesman. See Walpole, Sir Robert, first Earl of Orford.

OR'GAN (AS. *organe, organa,* from Lat. *organum,* from Gk. *ὄργανον, organon,* instrument, organ; connected with *ἔργον, ergon,* work, Av. *verez,* to work, Goth. *ga-waúrki,* OHG. *werch, werah,* Ger. *Werk,* AS. *weorc,* Eng. *work*). In biology, any part of a plant or animal that has a definite work to perform for the good of the whole being. In the possession of organs living creatures differ from mineral substances; consequently the former are called organisms and are said to be composed of organic matter, whereas the latter are inorganic. Even in the lowliest one-celled creatures organs make their appearance. The nucleus may be regarded as the first or oldest organ in organisms. The cytoplasm as well as nucleoplasm must, however, be regarded as composed of a complex of primitive organs which we cannot indeed see, but with whose behavior we are acquainted. These are the biophores or microsomes. In some of these organs, also called organoids, seems to reside the control of the nutrition; in others that of locomotion; in others that of sensation. Visible structures are also developed, such as a foamwork and often cilia. Thus even in its most primitive form protoplasm is already possessed of many organs; it is *organized.* Of the origin of the most primitive organism, of the source of this fortunate concurrence of mutually operating organs, we are totally ignorant.

Although even the simplest protoplasm is organized, organization becomes more complex in the higher forms. The organs become more numerous and have different ranks. There are the organs of gross anatomy, such as the eye, the stomach, heart, and the limbs, tissues, etc., which are complexes of organs of a lower rank, and are in turn made up of the unit organs, the cells. All cells have the organized structure of protoplasm. The essence of organization is division of labor. In a great factory each worker does a single stage of the work, so that if one drops out the work of the others is stopped. In such a factory, therefore, extreme division of labor is found, on the whole, to be immensely advantageous to the amount and quality of the work done; so in the organism. Important is the fact that, despite the extreme division of labor in the organism, the whole rules over the parts. So that even if an organ fails to perform its function completely, the organism may still survive through a regulative capacity in the rest of the organism.

Undeveloped and Vestigial Organs. There are certain organs in nearly all animals which attain little development; some seem, indeed, to be retrogressively developing. This retrogression may take place in the development of the individual or of the race, and seems to be due to disuse. The organs that are becoming degenerate in the race appear in a more or less rudimentary condition even in the embryonic life of the individual. They may later disappear in the individual development or long persist as vestigial and apparently useless structures. Organs occasionally occur which are imperfect, incomplete in structure, as a result of faulty or arrested development. Thus, rare cases of persistent gill slits occur in man, the two halves of the upper lip fail to fuse, or the heart is imperfect in construction. See Disuse.

Correlation of Organs. Certain organs of the body are physiologically or morphologically so interdependent that any change in the one brings about certain changes in the others. Such close relations between organs we call correlation. For example, such a relation exists between the length of the right and left arms and between the length of the arm and the stature.

Symmetry of Organs. Throughout all the animal kingdom an external bilateral symmetry of organs very generally prevails in the two sides of the body. These similar sides are called antimeres. This is the case in man and in all vertebrates. In the internal organs of the higher vertebrates, on the other hand, the two sides of the body present great diversities in the circulating, digestive, and other systems. This asymmetry has evolved from the symmetrical condition characteristic of the lower vertebrates. Even the external organs of the higher vertebrates, although similar on the two sides, are very imperfectly so. In the two hands, e.g., the blood vessels, nerves, and finger points of one differ from those of the other. In Mollusca bilateral symmetry sometimes exists, and is sometimes entirely lost, the one side remaining relatively undeveloped. In the Arthropoda the symmetry is in general as perfect as in vertebrates, and in the internal structure even more so. In the Echinodermata and Cœlenterata radial symmetry prevails, i.e., there are more than two similar antimeres (usually five) grouped around a chief axis. In sea anemones there are usually five of these antimeres; in Hydromedusæ four. In the vegetable kingdom a radial symmetry appears in the regular distribution of sepals, petals, stamens, etc., around the centre of the flower, and also in the arrangement of organs around the chief axis of the plant. See HOMOLOGY; HOMOPLASY; MORPHOLOGY.

ORGAN. A wind instrument, the most powerful and complex of all musical instruments. Its earliest history cannot be exactly traced, though it is safe to assume that its predecessors were the bagpipes and Pan's pipes. The *organum hydraulicum* of Ctesibius, a native of Alexandria (c.250 B.C.), has been described by his pupil, Heron, also of Alexandria, from whom it would appear that organs were made in Greece and Italy with wind generated by bellows (air pumps) and also by means of water, which partly filled the air chest and served as a cushion to steady the pressure of the wind. There is also extant a description (Greek) of an organ belonging to Julian the Apostate (fourth century A.D.), and there are other examples from Cassiodorus and St. Augustine. Further data are obtained from ancient reliefs, representations, and accounts which would seem to indicate that the instrument was known in the West even before the Emperor Constantine (Copronymos) sent a gift of one to King Pepin in 757. These early instruments were naturally imperfect, rarely possessing more than from 8 to 15 pipes; while the keyboard consisted of small upright plates made of wood which the performer pressed upon. The sound of the pipe continued until the key plate was restored to its former position. The organ is said to have been first employed in the church during the time of Pope Vitalian I (c.666 A.D.). Pepin placed the Constantine organ in the church of St. Corneille at Compiègne, and Charlemagne had one made at Aix-la-Chapelle, a model of the one at Compiègne. Caliph Harun al Rashid presented Charlemagne with an organ built by Giafur, an Arab. In Europe at this period the organ builders of Venice were considered the best, but in the following century both the French and the Germans made rapid strides. The great organ in Winchester Cathedral, described by the monk Wulstan, was the first instrument of importance erected in England. It was built about 980 A.D. Up to this time the instrument was worked by means of slides, which admitted wind to the pipes.

The modern keyboard (q.v.) grew out of the levers of this period, which have been well described as resembling those used by a railway signal switchman. The organ already mentioned at Winchester is said to have had 400 pipes and 2 claviers, each of which had 20 keys (the compass of the Guido monochord), and also had 10 pipes for each key, which were further reinforced in the octave and double octave. The special development of the twelfth century seems to have been the division into registers of the pipe work, which, with its complicated mechanism, caused a great increase in the size of the instrument and made necessary such large keys that they had to be struck with the fists or elbows. The introduction of reed pipes occurred in the fifteenth century, subsequent to the invention of pedals in Germany about 1350. Improvements were also made in the keyboard so that fingers could be used instead of fists. Organ building now became a regular art. The father of the modern organ-building craft, so far as any authoritative account is concerned, was Albert van Os, who flourished in the first half of the twelfth century and who is supposed to have been the inventor of pedals, although the idea is also attributed to Ludwig van Valbeke, of Brabant, and also to a German named Bernhard. Van Os built the celebrated organ of St. Nicholas Church at Utrecht. From this time also dates the influence of the organist on the builder, for improved instruments made possible the skillful organist, and his reflex influence discovered and developed further improvements and possibilities in the instrument. Coming to the time of Bach, we find the organ the most thoroughly developed and possibly the most important musical instrument of the period. Saxony, which may be described as the birthplace of the magnificent instrument of today, boasts of over 200 organ builders between 1359 and 1780, including such world-famous workmen as the Silbermanns, Hildebrand, Gabler, Sommer, and Herbst. The difference between the French and the German systems had an important bearing on the development of the various pipes. The French gave the reeds to the instrument, while the Germans invented the gamba family and brought the small wooden-pipe tone to great perfection. The next great discovery was a method for equalizing the wind pressure, by the introduction of inverted ribs in the upper reservoirs of the bellows, an improvement which made possible a more even wind pressure and consequently an evenness of tone which had hitherto been unattainable. A distinctive feature of the German organs was their echo organ, which contained stops reduplicating either the whole or the upper portion of some of the stops on the main organ. As they were built in an inclosed box they produced the effect of distance. An English maker, Abraham Jordan, in 1712 invented the simple contrivance of shutters, an invention which increased the tone of the echo stops and was practically the first real swell. In France the disposition of the stops in classes seems to have been the same as in Germany, Holland, and England. The organ of Saint-Roch (1750) had four manuals, of which the great and choir communicated by means of a spring. The third manual was for the reed stops and the fourth or upper for the echoes. The spring of communication was the predecessor of the modern coupler. Coming down to the nineteenth century we find the efforts of the builders directed to still further improvements in the wind apparatus and the keyboard. An Englishman, C. S. Barker (1806–79), noticed that in the great organ at York Minster several pounds' pressure was necessary to force down any single key. In the search for a remedy the principle of the hydraulic press occurred to him, with the result that he devised a movement or mechanism by which the action was set in motion by the expansive power of compressed air, so that the key, instead of being a lever which had to move a complicated mechanism of back falls, rollers, springs, etc., became a valve lever whose only function was to admit or cut off a small quantity of air in order to obtain a result greater than had been possible before. Barker offered his discovery to the celebrated builders, Messrs. Hill, of London, when they were at work on the organ in the Birmingham Town Hall, but they rejected it. The equally celebrated Parisian builder, Cavaillé-Coll (q.v.), was next approached, and promptly applied it to the organ of Saint-Denis. In 1852 Dr. Gauntlet took out a patent for the application of electricity, but never put his idea into practice. Again it was Barker who together with Albert Péschard (1836–1903) introduced the electropneumatic lever in 1861, but did not succeed in making the action reliable. The remarkable inventions of Robert Hope-Jones (1859–1914) for producing a light, rapid and absolutely reliable electric action revolutionized modern organ building. Thus the epoch-making inventions of the swell, the bellows, the pneumatic lever, and the rapid, reliable action belong to the English school of organ building.

Modern Organs. The modern organ is a very complex mechanism, and has grown more so since the application of electricity to the action. The instrument consists of three principal parts, the wind supply, the pipe work, and the action.

The wind supply consists of a number of bellows pumping air into a large storage bellows, where it is compressed by weights regulating the pressure. Several pipes, called trunks, convey the compressed air to the wind chests. These are wooden boxes upon which rest the pipes. Each pipe has at its lower end a valve, called pallet. When this is opened the wind enters the pipe and produces the tone. Formerly the bellows were operated by hand, but now steam or electricity is employed. The pressure of the wind is measured in inches of water, indicated by a manometer.

The pipe work includes all the pipes, which are made in more than 20 different shapes. The materials used are wood and metal. Almost all varieties of wood are used, while the metal pipes are made of an alloy of tin and lead. The larger the proportion of tin the finer is the quality of the tone. The pipes are set upon the wind chest in such a manner that all pipes of the same tone quality are arranged in rows or ranks. Each rank, except in the case of mixture stops (which will be explained presently), contains as many pipes as there are digitals on the keyboard, which in modern organs is 61 (five full octaves). The pipes set on one rank are collectively called stop or register, because they are controlled by the manipulation of a single stop knob.

As to the manner of producing the tone pipes are divided into two classes, reed pipes and flue pipes. In the former the tone is produced by the column of air causing a tongue to vibrate and strike against a reed; in the latter the air impinges upon a sharp edge. By variations in the measurements of flue pipes three distinct tone qualities are obtained. The full diapason tone, known as the foundation or true organ tone, is produced by open metal pipes of large scale. The tone C is produced by a pipe about 8 feet high with a diameter of 6 inches. The open metal pipes of narrow scale produce a tone resembling that of the stringed instruments and known as string tone. The stopped wooden pipes, generally spoken of as stopped diapason, yield a tone which, because of its resemblance to the flute of the orchestra, is designated as flute tone. Pipes are stopped by inserting in the upper part a stopper called tampion, tompion, or tamkin. A pipe thus closed sounds an octave lower than an open pipe of the same length.

When the open diapason, whose largest 8-foot pipe produces C, is drawn, all pipes sound the exact pitch corresponding to the digitals struck. Therefore the word "foot" is used as a unit of measure and all stops opening pipes of exact pitch are called 8-foot stops. Sixteen-foot and 32-foot stops are those whose pipes sound one and two octaves lower, respectively, than the corresponding digitals; 4-foot and 2-foot stops, one and two octaves higher. All these stops are classed as foundation stops. Mutation stops open more than one pipe for one digital (from three to six), causing, besides octaves, some other interval (generally the fifth and third) to sound. They are also spoken of as mixture or compound stops. Thus, when the digital C is pressed the full chord c-g-c'-e' is heard. In regard to range stops are classified as complete, incomplete, divided, and short. Complete stops have one pipe for every key of the manual. Incomplete stops, in older organs, extended only through part of the compass. Modern builders give them the full range. Divided stops are those where the treble and bass are controlled by two separate stop knobs having different names but one being the complement of the other. Short stops were incomplete and lacked the complement of the divided stops. Each stop is controlled by its corresponding stop knob, which operates a slider. This is a long, thin piece of wood with holes corresponding in size and position exactly with the openings at the bottom of the pipes. When the knob is drawn the holes in the slider coincide with the pipe openings and the wind enters the pipes. When the knob is pushed back the holes occupy intermediate positions between the pipe openings and the wind is shut off.

The complete organ consists really of from three to six partial organs, each controlled by a separate keyboard and stops. The solo organ contains the largest-toned stops in the instrument and is frequently supplied with extra heavy wind pressure (as much as 50 inches). In older instruments these stops were on the great organ, so called because it comprised the largest pipes. The swell organ consists practically of the same stops as the great, but of smaller scale. The name was chosen because originally it was the only section whose pipes were inclosed in a box provided with shutters allowing the gradual swelling and diminution of the sound. The choir organ is built of soft stops suitable for accompaniment of voices. It is now generally inclosed in a swell box. The pedal organ contains the deepest-toned pipes in great variety, so as to furnish suitable accompaniment to any combination of the other portions. Very large instruments have also an echo organ, the pipes of which are placed at the greatest possible distance from the rest of the organ.

The action is the mechanism that controls the actual playing of the instrument. Under this term are included the claviers, stop knobs, and combination pistons. The claviers played by the fingers are called manuals; that played by the feet, pedal. The manuals are known by the names of the organs which they operate. The lowest manual is the great, then come choir, swell, solo, and echo. In the most recent instruments the echo organ has no separate manual, but is played from one of the others. The compass of each manual extends from C to c^4. The compass of the pedal ranges from C_2 to G. But the combination of pedal and manuals does not indicate the real compass of the instrument. By the use of mutation stops (q.v.) a range of nine and one-half octaves, from C_2 to g^6, is obtained. Formerly the pedal keys were made perfectly straight, but now they are concave radiating, so that the player's foot is always at the same distance above every key.

Before Barker's invention of the pneumatic action, in 1832, all instruments had tracker action. When a key was pressed down a long, thin piece of wood, the tracker, pulled down a lever, at the end of which was a rigid bar. This in turn lifted another lever, to the other end of which was attached a second tracker, which then pulled down the pallet. To overcome all this resistance considerable force was required, and the amount increased with every additional stop drawn. In the pneumatic action this work is done by air pressure. The next step was to do away altogether with the complicated tracker system, and Horsell, in 1869, invented the tubular-pneumatic action, in which he substituted tubes conveying compressed air. Owing to the slow rate at which the column of air travels, this process proved unreliable on large organs. Various builders then experimented with electricity without much success. The high voltage required was a source of serious danger, and the action was no more reliable than the tubular-pneumatic. About 1890 Hope-Jones installed in the organ of St. John's Church, Birkenhead, an electric action that soon revolutionized organ building. The pallets are opened by an electromagnet energized from a contact in the keyboard, the power being transmitted by an electric wire, the whole operated on low voltage. The introduction of this action made it possible to move the console to any position at any distance from the organ itself. The console is the desk in which are the keys, stop knobs, and all mechanical levers manipulated by the performer.

The stop knobs are arranged on either side of the manuals, each manual having its own stops. Quite recently several builders have replaced the knobs by small tablets directly above the manuals. The lightest touch of the finger tilts the tablet, thus drawing the stop.

The combination pistons are mechanical levers serving many purposes. The oldest of these are the couplers, which were used as early as the middle of the seventeenth century. Thus it is possible to couple one manual to one or more others or to the pedal. If an 8-foot or unison coupler is drawn the notes played on one manual sound at the exact pitch on the manual that is coupled. A 4-foot or octave coupler causes the coupled notes to sound an octave higher; a 16-foot or suboctave coupler, an octave lower. Combination pedals are levers operated by the feet, so that with one touch certain combinations of stops can be called into action. Formerly these combinations were arranged by the builder, but Hilborne Roosevelt invented a device which gives the organist full choice of his own combinations. Hope-Jones invented the double-touch combination pedals, in which one lever controls both manual and pedal stops. A first light touch operates the manual stops; a second, heavier touch opens the pedal stops. The crescendo pedal is a device for producing a gradual crescendo by throwing on all the stops and couplers in a fixed order. By means of the sforzando pedal certain chords can be brought out with a strong accent. When the lever is touched with the foot the keys of the swell are for a moment coupled to those of the great. The swell pedal enables the performer to regulate the position of the shutters of the swell box. Formerly this pedal could be operated only by the foot, but Hope-Jones invented a mechanism by means of which the shutters are controlled by the player's fingers. A touch from the foot opens the pedal, and by urging the keys with the fingers the most delicate shading can be obtained.

Many modern organs are built on the principle of the transference of stops; i.e., a stop drawn on one manual can also be played from another manual. Isolated instances of single stops being thus transferred occurred as early as the sixteenth century. Again it was Hope-Jones who perfected the device, so that now it is possible to play any stop from any keyboard. The tremulant causes a metal tongue to oscillate in one of the wind trunks. The air then enters the pipe in pulsations, which produce an effect similar to the tremolo of the human voice.

Among the most important of quite recent improvements introduced by Hope-Jones are the double touch and pizzicato touch. The principle of the former was invented in 1854 by Victor Mustel and was utilized in his harmoniums. Hope-Jones applied it to the organ. In instruments equipped with this device the manual keys are provided with two springs. The ordinary touch of the finger releases the first, lighter spring, and the stops drawn on that manual speak. A little extra pressure depresses the key about one-eighth of an inch further, releasing the second, heavier spring. If the double-touch lever has been drawn, this extra depression causes those keys to be coupled to the corresponding keys on another manual. Pizzicato touch is produced by a coupler combining two manuals in such a way that the notes on one continue to sound as long as the keys are depressed, while on the coupled manual they sound for only a moment. The diaphone, invented by Hope-Jones, is a device for regulating the air waves before admission to the pipes. G. L. Miller regards this as "the most important step in advance hitherto achieved in the art of organ building. The author's opinion that before long every new large organ will be built upon the diaphone as a foundation is shared by all who have had opportunity to judge. By no other means known to-day can anything approaching such grand and dignified diapason tone be produced." Many new organs, especially those in concert halls, are provided with percussion stops, imitating the drums, chimes, xylophone, triangle, etc., of the orchestra.

With the constant increase in the number of stops the problem of wind supply became more and more serious. When all stops were drawn the wind was exhausted so rapidly that the old-fashioned bellows with weights proved inadequate for maintaining the proper pressure. Again it was Hope-Jones who first solved the problem by substituting springs for the weights. In 1894 John Austin invented the universal air chest, in which by means of a pressure board and compensating springs the wind is kept under uniform pressure. The bellows themselves have been almost entirely replaced by the kinetic blower, invented by Cousans. This consists of a series of fans on a rotary axis.

It may be of interest to compare two organs built by the same firm, Henry Willis and Sons, of London, in 1851 and 1914, respectively. The former was built for the great London Exposition, had about 4000 pipes, 70 speaking stops, and 7 couplers; the latter, built for the cathedral of Liverpool, has about 14,000 pipes, 167 speaking stops, 48 couplers, and 23 pedal combinations. At the time it was built it was the largest organ in the world.

Many ingenious contrivances have been invented to play the organ mechanically, of which the orchestrion (q.v.) is the most successful. The perforated paper roll, which revolutionized the piano-player industry, has also been applied successfully to the organ. An invention of quite a different character is the philharmonic organ (see WELTE), which fixes with photographic accuracy the performances of the world's great organists. How the records are prepared is a jealously guarded secret. The first records were made in 1912. See also UNIT ORGAN.

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ORGAN BIRD. The name of two different song birds, whose clear warbling notes suggest the tones of an organ. One is a wren (*Cyphorhinus cantans*) of the Amazon valley, the other a piping crow (q.v.) of Tasmania (*Gymnorhina hyperleuca*).

ORGAN'IC BASES. See ALKALOIDS; AMINES; PTOMAINES.

ORGANIC CHEMISTRY. The chemistry of the compounds of carbon. See CARBON COMPOUNDS.

ORGANIC SENSATIONS. "Sensations adequately stimulated by changes in the condition of the bodily organs. In every case the adequate stimulus consists of a change in the condition of the particular organ, and the organ itself is the peripheral seat of origin of the nervous excitation which is thus set up." (Külpe.) The only difference then between the sensations of special sense and the organic sensations is that the organs of the former are stimulated from without by some movement process in the external world, while the latter are aroused by a bodily process within the organ itself. The distinction is convenient for purposes of classification, but has no psychological importance, since the sensations of the five senses also presuppose a change in their organ; the stimulus makes its impression on the brain by way of a bodily process in eye, ear, etc. Joints, muscles, tendons, and most of the internal tissues and viscera may become the seat of organic sensations.

The classification of organic sensations is sometimes made with reference to their place of origin. In this way we may distinguish (1) kinæsthetic sensations, (2) sensations of the alimentary canal, (3) sensations of the circulatory system, (4) respiratory sensations, (5) sexual sensations, and (6) the ampullar and vestibular sensations of the static sense. It appears, however, that no such sharp lines of division can be drawn upon the qualitative side, although the evidence is not yet complete. Probably all the organic sensations are reducible to a few qualities, like those furnished by the skin, or even in some cases identical with them. (See CUTANEOUS SENSATIONS.) The kinæsthetic sensations, which furnish the perceptions of weight, resistance, and position, are all forms of pressure or of pain. (See MUSCLE SENSE.) The alimentary canal furnishes upon distention the qualities of pressure and pain, which are like those of deep pressure and deep pain from the superficial tissues. The œsophagus, and probably the stomach, are also sensitive to cold and warmth. Thirst, hunger, and nausea are often spoken of as alimentary sensations. Thirst is, however, nothing but the pressure and pain of extreme dryness of the mouth and (sometimes) of the pharynx. In its mild stages thirst may not be sensory at all, but may consist merely in the impulse to get a drink. It may be quenched by painting the buccal tissues with acid or by placing a cold, though dry, object in the mouth. The essential quality in hunger is pain, a dull gnawing ache which is identical with the deep pain just mentioned. It is produced by certain rhythmic contractions of the stomach, which occur in the absence of food, and usually cease as soon as solid matter enters the organ. Nausea proves upon analysis to be highly complex. Its usual core is a pain identical with that of hunger, a fact which explains the frequency with which persons suffering from incipient indigestion mistake nausea for hunger. The pressures of incipient vomiting, dizziness, eye strains and visual derangements, and general bodily disturbances, such as weakness, sweat, and shivering, must all be included in the typical picture of nausea, although no one of them is indispensable. Many sensational complexes find their stimulus in changes of the circulatory system. Itching, tingling, formication, pins and needles, tickling, creeping, feverishness, are examples. All these are complexes of pressure and pain, and come in many instances from surrounding tissues. The veins are probably directly sensitive to pain. A specific heart sensation has been suggested, but its existence is doubtful. The feeling of constriction in angina pectoris may be attributed to the intercostal muscles. The existence of respiratory qualities has been posited in order to account for the specific character of such experiences as panting, bracing air, stuffiness, etc.; but these qualities still lack adequate proof. A systematic study of sexual sensation is wanting. Such analysis as has been made points again to a fusion of pressure and pain in a highly complex pattern. Dizziness or giddiness is mediated by the semicircular canals of the inner ear, and is apparently related to the balancing and orienting function that these canals discharge. Whether or not dizziness constitutes a unique quality, or is merely a mode of pressure, has not been conclusively shown. See STATIC SENSE.

The reduction of the greater part of our complex organic life to pressure and pain raises the question whether these two terms themselves cover a number of different qualities. Of pressure there is little to say. Most of the internal pressures are qualitatively similar. The bright contact quality of cutaneous pressure cannot be aroused within the organism; but the dull diffuse pressures that we find are very similar to articular or muscular pressure. Of pains there appears at first glance to be a great variety. Pains may be gnawing, aching, sore, crampy, colicky, griping, pressing, neuralgic, boring, drawing, tearing, stabbing, biting, sharp, darting, burning, stinging, etc. A recent clinical work mentions 49 kinds of pain. The pains vary in character according to their place or mode of origin. They may be throbbing, as in toothache; dull and gnawing, as in extreme hunger or in inflammation of the bowels; dull and throbbing, as in lesion of the rectum; acute and shooting, as in neuralgia; acute and intermittent, as in colic; acute and constant, as in peritonitis; dull and nauseating, as in certain diseases of the ovaries and testicles; pressing, boring, constricting, cutting, piercing, as in headaches; burning or smarting, as in certain skin wounds; dragging, as in certain forms of rheumatism. It is natural to refer these differences to differences of quality. If we look at the facts more closely, however, we see that certain of the descriptive adjectives point unmistakably to simple differences of time and of intensity. A throbbing pain is an interrupted pain; a shooting pain is one that shows, besides intermittence, a quick rise of intensity as it runs its course; a piercing pain is intensive, a dull pain is weaker. Moreover, all the concrete pains are intermixed with sensations peculiar to the organs which mediate them: a sickening pain contains nausea, a dragging pain contains a mass of muscular sensations. These concomitant sensations, again, are variously localized: an acute pain seems to occupy a small area, a dull pain is massive and widespread. When we take these facts into account and remember the specific differences to which variations of time and intensity may give rise in conscious complexes other than pains, the conclusion is almost irresistible that the pain quality is one and the same throughout. We need not, however, be overhasty; it may be that pains differ qualitatively in size, perhaps also in acuteness; the dragging pain is bigger than the darting pain, a gnawing ache is more massive than a sting; the griping pain is more acute than the dragging, and the darting pain not quite so dull as the stinging. Tones seem to possess a volume which is not extensive, and we should therefore be cautious in setting forth a psychology of pain.

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OR'GANISM. A living being, plant or animal, of which the essential constituent is protoplasm (q.v.; also ORGAN). The world of organisms, or the organic world, is opposed to the mineral world—to lifeless things. There may be a degree of organization in a mineral, but it is a nonliving, inorganic substance. An organism is a living being more or less differentiated into parts or organs, each with its peculiar formation.

OR'GAN MOUNTAINS. The highest portion of the Brazilian coast range or Serra do Mar (q.v.).

OR'GANOG'RAPHY (from Gk. *ὄργανον*, *organos*, organ + *-γραφία*, *-graphia*, writing, from *γράφειν*, *graphein*, to write). That division of biology which treats of the origin and cause of form. See LEAF; ROOT; STEM.

OR'GANOMETAL'LIC COMPOUNDS. An interesting group of chemical compounds in which organic radicles, such as methyl, CH_3, ethyl, C_2H_5, etc., are united to metals. Zinc ethyl, which is a good example of the class, is obtained by digesting granulated zinc with ethyl iodide, C_2H_5I, at a temperature of about 127° C. (roughly 260° F.) for several hours. It is thus obtained in the form of a colorless, transparent, mobile liquid, which strongly refracts light, has a powerful, rather disagreeable odor, and is considerably heavier than water. Its boiling point is 118° C. (244.4° F.). Chemically it is very unstable, and when exposed to the air it takes fire spontaneously; it must therefore be handled with care and kept in vessels filled with carbonic-acid gas. The properties of other organometallic compounds of zinc, such as zinc methyl, $Zn(CH_3)$, zinc propyl, $Zn(C_3H_7)_2$, etc., are similar to those of zinc ethyl, and so are the methods of preparing them. Among the corresponding compounds of lead must be mentioned lead tetraethyl, $Pb(C_2H_5)_4$, and lead triethyl, which probably corresponds to the molecular formula $Pb_2(C_2H_5)_6$. The former of these may be obtained by the action of lead chloride on zinc ethyl, the latter by the action of an alloy of one part of sodium and three parts of lead on ethyl iodide. It will be seen that while in its most stable inorganic compounds lead is divalent, in its organic compounds it is quadrivalent; in the case of its tetraethyl compound this is evident; but the triethyl, too, probably has the constitution $(C_2H_5)_3Pb - Pb(C_2H_5)_3$, and hence contains lead in the quadrivalent state. Other metals capable of forming organic compounds include mercury, magnesium, cadmium, aluminium, thallium, and probably also sodium and potassium. In the case of metals whose atoms possess more than unit valency, compounds have been obtained in whose molecules a metallic atom is combined at the same time with organic radicles and with halogen atoms (like chlorine or iodine) or hydroxyl groups (OH). Thus, the compound known as mercury ethyl chloride has the formula C_2H_5HgCl, mercury methyl iodide has the formula CH_3HgI, lead trimethyl hydroxide has the formula $Pb(CH_3)_3OH$, etc. The hydroxyl compounds, like that just mentioned, are strongly basic—about as strong, in fact, as caustic soda or caustic potash. Among the most valuable metallo-organic compounds of the type just mentioned, are those formed by metallic magnesium with halogen derivatives of the hydrocarbons in ethereal solution. See GRIGNARD REACTION.

The organometallic compounds, especially those of magnesium, are useful in the synthetic preparation of organic substances. The earliest known metallo-organic compounds were discovered by Frankland, and it was while studying these compounds that Frankland first conceived the idea of valency, which has since formed an essential part of the atomic theory.

OR′GANON. See Aristotle.

OR′GANOTHER′APY (from Gk. ὄργανον, *organon*, organ + θεραπεία, *therapeia*, attendance, medical treatment, from θεραπεύειν, *therapeuein*, to attend, treat), or Opotherapy (from Gk. ὀπός, *opos*, juice + θεραπεία, *therapeia*, medical treatment). The use of animal organs, their extracts or active principles as medicines. The belief that animal glands and tissues have a specific effect when administered to the human individual has persisted among savage and civilized people from time immemorial. The medical writings of the Egyptians, Greeks, and Romans all contain references to their use. Davies claims that the use of animal remedial preparations dates from 1500 B.C. Salmon, in his work published in 1677, mentioned an enormous number of preparations made from both human and animal tissues. During the Middle Ages and even later animal therapy reached a grotesque and even revolting development; and among isolated communities at the present day survivals of this practice are still observed. Chinese therapeutics is said to abound in examples of this kind. The scientific study of the ductless glands began in 1850 with Berthold, supplemented a little later by Claude Bernard; but modern organotherapy really originated with Brown-Sequard in 1856. He advanced the hypothesis that "all glands of the body, whether they are excretory canals or not, give to the blood useful principles, the absence of which is felt when the glands are extirpated or destroyed by disease." Recent experiments confirm this view and substantiate the statement of Brown-Sequard (q.v.). His famous elixir, consisting of an extract of lambs' testicles, he administered to himself, and reported marvelous stimulating and rejuvenating effects. While other observers failed to substantiate his somewhat extravagant assertions, it was recognized that there undoubtedly existed a powerful oxidizing and stimulating element in these organs, and physiologists were led into wider fields of investigation. In the United States C. E. de' M. Sajous (q.v.) has paid special attention to organotherapy since 1903 and has classified it as a branch of medicine under the name "hemadenology." Almost every gland and tissue in the body has been studied experimentally, and several substances of unique value have been added to our therapeutic resources, e.g., adrenaline, thyroid extract, and pituitary extract. To a large extent, however, organotherapy still rests upon an empirical basis, and this for several reasons: some of these glands have more than one active principle; similar physiological effects are produced by several glands; antagonisms are observed between certain glands and even parts of the same gland, and it is difficult to analyze the symptoms calling for a particular principle; there is the great difficulty of securing active preparations, many of those on the market being inert; and finally there is undoubtedly a subtle vital difference between animal extracts and their human equivalent. (See Secretions, Internal.) By many writers these active principles are considered as chemical entities which they term hormones (q.v.), typical examples of which are secretin, adrenaline, and thyroid extract.

Organotherapy is employed in four different ways: (1) Substitution therapy, in which the gland or its extract supplies a definitely known lack of the system, e.g., the giving of thyroid in hypothyroidism; (2) supplementary therapy, which remedies a deficiency, temporary or permanent, of glandular secretion; this is exemplified by giving corpus luteum in amenorrhœa and pancreatic extract in glycosuria; (3) specific physiological therapy, in which an extract or active principle is given for its known specific action, irrespective of glandular disease or deficiency; a familiar instance is the employment of adrenaline for its styptic action; (4) empirical application includes the administration of gland substances which are apparently indicated from experimental or clinical experience, although not always explainable on a scientific basis. Notable examples of this are the parathyroid treatment of paralysis agitans, the thyroid treatment of arthritis deformans, and the employment of a combination of glandular extracts in neurasthenia.

Animal extracts should be prepared from adult healthy normal animals. Those preferably selected are sheep and hogs. Gland tissues are no longer given raw. The thyroid gland has been transplanted into cretins with some degree of success. Many different preparations have been made, among which may be mentioned glycerin extracts, watery extracts, the dried and powdered gland, and compressed tablets. Some glandular principles are inactive when given by the mouth and must be injected hypodermically to secure their physiological effects. Only a few of the most important and constantly active preparations can be described here.

The thyroid gland has a profound influence on nutrition, and disorders of it set up very definite physiological disturbances. Cretinism, myxœdema, and many nervous manifestations are due to a lack of its secretion, and accordingly these diseases are effectively treated by doses of thyroid extract. The gland is also given in obesity, certain forms of neurasthenia, chronic rheumatism, chronic skin diseases such as psoriasis, and disturbances of nutrition in the scalp, hair, and nails, and in many other conditions due to faulty metabolism. Thyroid must be given with care and in small doses at first, since it contains great possibilities for harm.

The parathyroid glands were discovered by J. Sandstroem in 1890. They are four bodies, each about as large as the head of a pin, embedded in the thyroid gland. Although exceedingly small they exercise a powerful influence upon the nervous system, their removal resulting in tetany; they have also a powerful detoxicating influence. Unlike the thyroid, they contain no iodine. They are said to influence calcium metabolism, and it has been proved that the tetany which follows their removal is caused by withdrawal of calcium from the cells. These manifestations are promptly controlled by calcium feeding. The principal therapeutic use of the parathyroids is in paralysis agitans, tetany, epilepsy, and chorea.

The thymus gland is active in fetal life and early childhood, but normally disappears in adult life. The gland is, in its period of activity, intimately related to the phenomena of growth and development. It is concerned in the retention of the calcium salts by the body and in the ossification of bone. This gland is given in malnutrition and delayed development, rickets, certain cases of goitre, in chlorosis, and in rheumatoid arthritis.

The adrenal glands are two small bodies situated at the upper pole of the kidneys, and have an active principle known as epinephrine or adrenaline (q.v.). This was first isolated by J. Takamine and has since been reproduced synthetically. The most remarkable action of epinephrine is constriction of the blood vessels, thus raising the blood pressure; locally it is a powerful hæmostatic. It is given in conditions of surgical shock and in collapse due to diseases such as Asiatic cholera, typhoid, etc. Disease or destruction of the adrenals is the essential lesion of Addison's disease (q.v.), and victims of this malady can sometimes be kept alive for long periods by the administration of suitable doses of the adrenal gland. Adrenaline is useful in asthmatic attacks, where it acts by virtue of its vasoconstricting principle.

Among the more recently studied glands of internal secretion is the hypophysis, or pituitary body, which lies in a bony bed at the base of the brain. It is composed of an anterior and a posterior lobe and an intermediate portion consisting almost entirely of cellular tissue. The anterior lobe or glandular portion is of a yellow or reddish-gray color and has a glandular structure, while the posterior lobe, also known as the infundibulum, is of a whitish color and is composed of connective tissue fibres, nerve cells, and eosinophile cells. Each of these portions of the gland has a different function. A great deal remains to be learned about the hypophysis, but it has come to have an important part in medicine owing to its action upon unstriped muscle fibre, particularly that of the uterus. Pituitary extract (in the form of pituitrin, prepared from the infundibulum) is now given to hasten labor, to stimulate the peristaltic action of the intestine in paretic conditions, in shock, in uterine hemorrhage, in amenorrhœa, in polyuria, and to stimulate the secretion of milk.

Closely related to the hypophysis is the pineal body, or epiphysis, a small mass situated just behind the pituitary body. This is believed by Dana and Berkeley to influence during early life the development of the reproductive organs, the deposition of subcutaneous fat, and physical and mental growth and development. These observers have given a watery extract of bullocks' pineal glands to mentally backward children for long periods with a distinctly favorable effect.

Of the reproductive glands, orchitic extract, while not enjoying much favor, has been shown to promote oxidation in the body, and has been given with varying results in hysteria, neurasthenia, locomotor ataxia, epilepsy, and insanity. Ovarian extract is similar in its action, though less powerful. An intensified effect is obtained from extract of the corpus luteum. These substances have been used in chlorosis, in the nervous disturbances following oöphorectomy, and during the menopause. Great caution is advised in their use.

The term "organotherapy" has been modified for the sake of convenience to include the employment of extracts prepared from various tissues of the body as well as the glands mentioned. We include therefore under the term extracts of the brain (cerebrin) recommended in neurasthenia, chorea, various psychoses, and conditions in which agoraphobia is present (see INSANITY); extracts of the kidney, recommended in treatment of anæmia, myxœdema, rickets, enlarged spleen, typhoid fever, goitre, leucocythæmia, and Hodgkin's disease; as well as musculin, extracted from the muscle of the ox; mammary extract, obtained from the udder of the cow; and pulmonin, extracted from the lungs of calves.

Many of these extracts are apparently inert. Many others are therapeutically useless in the present state of our knowledge. Nuclein and bone-marrow extracts, however, are valuable preparations, and secretin, first isolated by Baylis and Starling in 1902, has lately come into serious notice. This is a substance made from the pyloric-duodenal mucous membrane and has a powerful influence in stimulating gastric, pancreatic, and hepatic activity. It is indicated in the treatment of digestive insufficiencies, in infantile diarrhœa, in malnutrition and cachexia, in diabetes mellitus, and in tuberculosis. Mention must be made of thrombokinase, a principle isolated from the blood platelets and favoring clotting of the blood in hemorrhage, whether given internally or applied locally.

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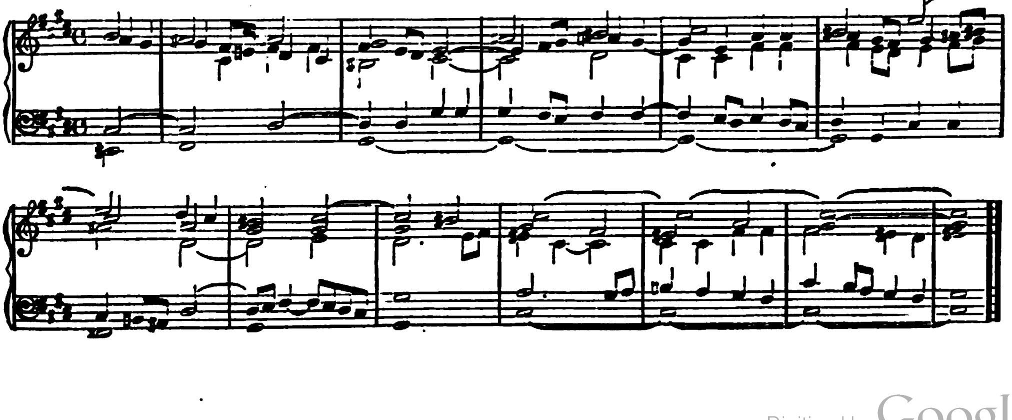
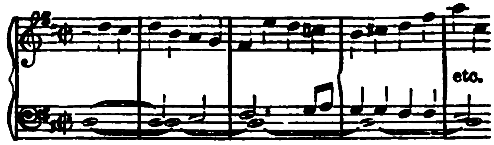
OR'GAN POINT. A long-sustained tone in one voice while the other voices proceed in independent harmonies. The name is derived from

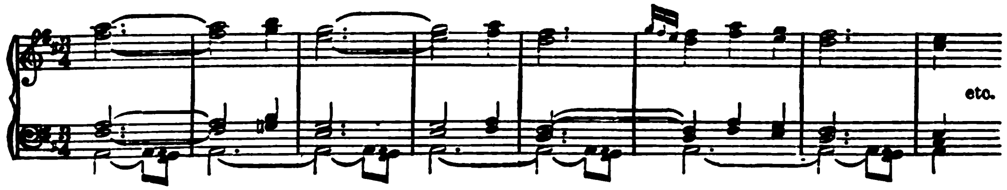


organicus punctus, which in the twelfth century, the time of the organum (q.v.), was a long-sustained note of indefinite duration generally held by the tenor (whence the name of the voice), over which the other voices executed a florid counterpoint. Organ point is also called pedal point, because the pedal of the organ is best suited to sustain those long notes. But for etymological reasons it is best to use the name organ point. The organ point may occur in any voice. It seldom occurs in the middle voices, more frequently in the soprano, but generally in the bass. The modern tendency is to recognize the organ point only in the bass; hence the sustaining of a long note in the soprano is called holding note. The laws governing the introduction of an organ point in the bass are: (1) that the sustained note shall be either the tonic or dominant; (2) that it shall begin and end on a strong beat and form an essential part of the harmony of the beginning and closing chords. During the organ point the other voices may proceed through any chords. Of course modulation of any length is excluded. An organ point is generally introduced just before the end of a composition. Bach and Handel end many of their fugues on an organ point. The following from the scherzo of Beethoven's Ninth Symphony is an organ point on the tonic:



In Fugue No. 4 from part i of the *Well-Tempered Clavichord* Bach introduces an organ point on the dominant before the close which he constructs over an organ point on the tonic, at the same time giving a holding note to the soprano.

A double organ point on both tonic and dominant is often found in modern compositions, especially in those of a pastoral character. A fine example is found in the first movement of Beethoven's Pastoral Symphony (beginning at bar 29). There is also a figured organ point, when the sustained note is varied, sometimes with a single note, sometimes with a group of notes. The following example from Beethoven's Seventh Symphony (trio of scherzo) illustrates this:



The longest organ point that has ever been written consists of 138 bars and occurs at the beginning of the prelude to Wagner's *Rheingold.*

OR'GANUM (Lat., from Gk. ὄργανον, instrument, organ). In music, a term used to denote the primitive attempts at polyphony by leading the voices in open fifths. The first step (this was already known to the ancient Greeks) was doubling the voices in the octave. Late in the ninth century a second part was added a fifth below, and soon after a fourth below. See HARMONY; MUSIC, HISTORY OF; POLYPHONY.

ORGANZINE, ôr'gan-zēn (from It. *organzino*, organzine). A silk thread used chiefly for warp in silk weaving. It is formed by the union of two or more single threads, which are twisted separately in the same direction and are then doubled and retwisted in the opposite direction. See SILK.

ORGETORIX, ôr-jĕt'ô-rĭks (?–c.62 B.C.). A rich and powerful chief of the Helvetii (q.v.). According to Cæsar he wished to possess himself of the chief power in his state, and therefore persuaded the Helvetii to emigrate to Gaul (61 B.C.). In consequence he was summoned to trial, but died, perhaps by his own hand, before the case could be heard. Consult Cæsar, *De Bello Gallico* (i, 2, 26), and Dion Cassius, xxviii, 31.

ORGEYEV, ôr-gyā'yĕf. A district town in the Government of Bessarabia, Russia, situated 28 miles north of Kishinev (Map: Russia, C 5). There are some ruins of the old Dacian fortress, the site of which is now occupied by the town. Agriculture and gardening are the chief occupations. Pop., 1897, 13,356; 1911, 18,000.

ORGIES, ôr'jĭz (Lat. *orgia*, from Gk. ὄργια, secret rites; probably connected with ἔργον, *ergon*, work, and ultimately with Eng. *work*). The name given in ancient Greece to the secret rites and ceremonies connected with the worship of various divinities, particularly the wine god Dionysus or Bacchus. From the boisterous songs and dances of this ceremony the word acquired an evil meaning not in its original use. See MYSTERIES.

O'RIAN'A. The daughter of Lisuarte of England, beloved by Amadis of Gaul, and celebrated for her beauty and constancy. Queen Elizabeth is so called in the madrigals entitled *The Triumphs of Oriana*, collected by Thomas Morley (1603).

ORIANI, ō'rē-ä'nē, BARNABA (1752–1832). An Italian astronomer, born at Garegnano, near Milan, the son of poor peasants. Supported and educated by the Barnabites, he was ordained a priest in 1775. After his ordination (1776) he studied astronomy at the observatory of Brera in Milan, became assistant in 1778, and director in 1802. After the discovery of Uranus (1785) Oriani showed that it was not a comet, as Herschel had supposed, but a planet. He edited *Effemeridi di Milano* (1778–1830), wrote much on astronomy, and made some important contributions to spherical trigonometry. Napoleon made him Count and Senator of the Kingdom of Italy. He contributed valuable papers to the *Effemeridi* and published also a series of important books and memoirs, among them a classic, *Elementi di trigonometria sferoidica* (1806). His correspondence with Giuseppe Piazzi was edited by Cacciatore and Schiaparelli (Milan, 1875).

OR'IBA'SIUS (Lat., from Ὀρειβάσιος, *Oreibasios*), OF PERGAMUM (c.325–c.400). The physician and adviser of the Emperor Julian the Apostate. After the death of Julian Oribasius was banished by Valentinian and Valens, but was recalled about 370. Of his principal work, a medical encyclopædia, *Συναγωγαὶ Ἰατρικαί*, in 70 books, less than half is preserved. It was written at the request of Julian. Though chiefly a compilation of earlier works, it contains some important original matter, valuable explanations of many passages in Galen's works, and extracts from works not extant. We have, in addition, Oribasius' abridgment (*Σύνοψις*) of this work, in nine books, and the *Εὐπόριστα*, also a medical treatise, in four books. The best edition is by Daremberg (6 vols., Paris, 1851–76). Oribasius was the first to describe the salivary glands. See MEDICINE, HISTORY OF. Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

ORIBE, ō-rē'bȧ, MANUEL (c.1796–1857). A Uraguayan soldier and politician, born in Montevideo. He entered the patriot army of Río de la Plata when he was only a boy and rose to the rank of general. In 1825 he was prominent in the rising against Brazil. He became Minister of War under Rivera in 1833 and was elected President two years afterward. Rivera, as leader of the Colorado party, rebelled against Oribe in 1837 and succeeded in deposing him just before the end of his term. Oribe fled to Buenos Aires and with the help of Rosas began (1842) the Nine Years' War, an attempt to subjugate Uruguay to foreign rule. The interposition of France and Brazil forced him out of the country. Again in 1855 he led a revolt against Flores and would have made himself President but for the intervention of the Powers.

O'RIBI, or **OU'REBI** (South African name). A small antelope (*Neotragus scoparius*) which is closely allied to the grysbok and inhabits southeastern Africa, where it has become rare.

ORIEL (ō'rĭ-*e*l) **COLLEGE.** A college at Oxford, England. It was founded by Adam de Brome, clerk in chancery and almoner of Edward II, in 1324, but almost immediately thereafter came into the hands of the King and was refounded as the College of St. Mary in Oxford. This in turn gave way to the present name, apparently on account of the society's moving into a house given it by Edward III, about 1328, called La Oriole. Oriel College consisted originally of a provost and 10 fellows. Owing to the fact that the founder's will did not provide for close scholarships, or those confined to a family or district, as was the custom of the time, the open fellowships of Oriel, obtained as they were by competition, attracted many of the best men in the university in later years and built up a strong and influential group of scholars who gave the college an enviable position in the academic world. The foundation consists of a provost, 12 fellows, a number of honorary fellows, college officers, and lecturers, about 22 scholars and exhibitioners, 2 Bible clerks, and some 150 undergraduates in all. The buildings are picturesque and the hall is a very fine room. The college is particularly associated with that group of men who were most actively engaged in the Tractarian movement—Keble, Whately, Newman, Thomas Arnold, and Pusey. Of other names may be mentioned William Langland (author of *Piers Plowman*), Barclay (author of *The Ship of Fools*), Sir Walter Raleigh, William Prynne, Bishops Butler, Wilberforce, and Hampden, White of Selborne, Dean Church, Thomas Hughes, Matthew Arnold, Clough, and Cecil Rhodes. The college presents to 15 livings. Consult D. W. Rannie, *Oriel College* (London, 1900). See OXFORD MOVEMENT; OXFORD UNIVERSITY.

ORIEL WINDOW (OF. *oriol*, from ML. *oriolum*, small room, porch, perhaps from Lat. *aureolus*, golden, from *aureus*, golden, from *aurum*, gold). A projecting or bay window in an upper story, supported on corbeling or brackets or on an engaged column, as distinguished from bay windows built up from the ground. It is characteristic of late Gothic and early Renaissance civil and domestic buildings, especially in France and England, and was not much used in the earlier Middle Ages.

O'RIEN'TAL CHRISTIANS. See NESTORIANS.

ORIENTAL EMERALD, RUBY, TOPAZ. See CORUNDUM.

ORIENTAL EMIGRATION. See ORIENTAL IMMIGRATION.

ORIENTAL GARNET. See GARNET.

ORIENTAL IMMIGRATION. There were 2039 Japanese in the United States as early as 1890. The law which excluded Chinese was not applicable to them. In the closing years of the nineteenth century the numbers coming to America began to increase; 12,626 arrived in 1900. According to the census of 1900 there were 24,326 Japanese in the United States, over one-half of whom lived in California. After 1900 direct emigration from Japan was discouraged and the number arriving in 1901 was only 4908. Japanese in Hawaii were no longer under the control of the home government. From 1902 to 1905 over 20,000 Asiatics, mostly Japanese, left these islands for the mainland. Besides these, from 1902 to 1907 nearly 47,000 came direct from Japan.

In 1905 agitation against the Japanese started in San Francisco. After the great fire of 1906, which had burned down the school which most of the Japanese children attended, the school board decided to segregate the Orientals in a separate building. Japan protested vigorously and the action of the school board was rescinded. An agreement was reached in 1907 by which Japanese immigration should be restricted; the Japanese government discontinued the grant of passports to her subjects coming to the United States except to former residents, parents, wives, and children of residents, and settled agriculturists. By order of the President (1907) Japanese coming to the United States from Hawaii, Canada, and Mexico were refused admission. Since 1909 the number of departures has tended to exceed the arrivals.

YEAR	Admitted	Departed
1908	9,544	4,796
1909	2,432	5,004
1910	2,598	5,024
1911	4,282	5,869
1912	5,358	5,437
1913	6,771	5,647

In 1910 there were 72,157 Japanese in the United States, 41,356 of whom lived in California.

Notwithstanding the settlement of the immigration question, agitation still persisted in California. Seventeen anti-Japanese bills were before the Legislature in 1909, the chief of which were an alien land bill and one for school segregation. Partly as a result of the intervention of the President these bills failed to pass. Similar measures were brought up in Nevada, Oregon, and Montana, but were defeated. In 1913 the matter was again before the Legislature and a law was passed prohibiting the acquisition of farm land by "aliens ineligible to citizenship" and providing for leases for a maximum period of three years. The Treaty of 1911 had guaranteed to the Japanese the right to acquire land for residential and business purposes, but had said nothing as to agricultural land.

The Immigration Commission of the Federal government made an exhaustive investigation of the whole question in 1909. They estimated that in California there were not over 4500 Japanese farms, covering 150,000 acres. Of these only 16,000 acres were owned. These figures may be compared with the 11,000,000 acres of improved farm land in California.

Prof. H. A. Millis, of the commission, estimated that in 1909 there were 80,000 Japanese engaged in gainful occupations; approximately 40,000 were engaged in agriculture, 12,000 to 15,000 in domestic service or related employments, and 10,000 or 11,000 employers or help in the 3000 Japanese business establishments. In the main the Japanese are employed in unskilled labor. They were excluded from factory labor by the action of the employers and the labor unions; a precedent had been established by the exclusion of the Chinese from the factories. The Japanese immigrants found employment as section hands on railroads, in construction gangs, as "cannery hands," as laborers in the sugar-beet fields and in other branches of agriculture. In some lines of agriculture, notably in the growing of vegetables, and in strawberry and small-fruit culture, Japanese immigrants were practically the only available supply of labor. The possibility of hiring them through contractors and for a short season only made them especially available. Sometimes they took advantage of the situation by making a demand for higher wages in the midst of the harvest season. The system of leasing lands to Japanese grew up in the effort to insure an adequate supply of labor in the harvest time. The Japanese themselves were willing in many cases to pay a higher rent than others, and preferred to settle down and farm to continuing in wage labor.

The early agitation for the exclusion of the Japanese, arising as it did before any great numbers had come to America, is to be explained partly from the success of the Chinese exclusion policy and partly from the knowledge that wages and the cost of living in Japan were much lower and that, aided by the systematic stimulation of emigration by the organized emigration companies, it would not be long before the Japanese problem would become acute.

According to the estimates of the Immigration Commission there were some 5000 East Indians, mostly Sikhs, in the United States in 1909. According to the census of the following year there were only 3000. They are not usually considered as good workmen as the Japanese. They are employed in lumber mills and rope factories, on the railroads and in agriculture. In regard to naturalization their status has not yet been settled. A Parsi was admitted to naturalization by a Federal district court in New York.

In Hawaii prior to annexation the method of securing labor by contract or indenture was prevalent and favored the employment of Chinese and Japanese labor. Before 1883 Chinese were brought to the islands, and since then the Japanese have come in increasing numbers. After annexation in 1898 Chinese were excluded by the United States laws and contract labor was abolished. In 1900 there were 56,230 Japanese and 25,762 Chinese in a total population of 154,000. Beginning in 1905 there was a strong current of Japanese to the mainland, but this was stopped in 1907 and further immigration greatly restricted. Japanese arrivals from 1900 to 1910 numbered 77,421, against which must be placed departures of 75,186, leaving a net gain of 2235 according to the figures of the immigration authorities. The census figures give a better index of the growth of the Japanese colony. In 1910 there were 79,675 Japanese, making 41.5 per cent of the population. The Chinese population decreased by over 4000 in the decade, to 21,698 in 1910.

According to the census of 1902 the Chinese population of the Philippines was 41,035. There is a considerable movement of Chinese to and away from the islands, with usually a slight excess of arrivals over departures. In 1911 there was an excess of 896 arrivals. An estimate of the Bureau of Customs in 1908 placed the Chinese population at 56,000. Their number in 1915 was estimated at 50,000. Japanese immigration in 1904 amounted to 2500, but since 1905 has shrunk to insignificant proportions.

Chinese immigration into Canada never reached the proportions it assumed in the United States. In 1901 there were 16,792 Chinese in Canada, practically all of them in British Columbia. In 1886 a head tax of $50 was imposed; in 1901 the amount was raised to $100, and three years later, as the influx still continued, to $500. The number admitted in 1900–01 was 2518; from January to June, 1904, none were admitted; in 1910–11 the number has risen to 5278. The increase of the entrance fee served to cut off the supply entirely for three or four years. But the wages of the Chinese labor in British Columbia rose as the supply became limited, and the Chinese in the country were thus enabled to secure the funds for paying the increased tax on bringing their kindred over from China. A large number of immigrants pass through Canada in transit to the West India islands and other points.

Japanese immigration to Canada was never very considerable in amount. In 1901 there were 4674 Japanese in the Dominion. In 1905–06, 1922; in 1906–07 (nine months), 2042; and in 1907–08, 7601 Japanese immigrants arrived. After the restrictions were placed on the immigration from Hawaii to the United States the current seems to have been transferred to Canada, but soon dwindled. An informal agreement between the Canadian and the Japanese governments was reached in 1909 by which the issue of passports for Japanese coming to Canada is limited to 400 annually.

Hindu immigration to Canada did not reach large proportions before 1907. In that year (in nine months) 2124 and in the succeeding year 2623 Hindus arrived in British Columbia. A special difficulty with the exclusion of the Hindus is that they are British subjects, and discriminations against them might lead to dissensions within the Empire. The immigration was not spontaneous, but was stimulated by circulars giving far too favorable a view of the conditions. The activities of steamship agents and of individuals in British Columbia in encouraging immigration were stopped. Practically total exclusion was secured by the application to the Hindus of a continuous-route provision of the Canadian immigration law; immigrants who do not come by continuous passage and on through ticket are liable to be sent back, and there is no way by which Hindus can reach Canada in a continuous passage. Furthermore, emigration from India is unlawful under the Indian Emigration Act of 1883 except to countries where suitable laws are enacted for the protection of emigrants. A tax of $200 is required of each Hindu immigrant since 1908. Only six Hindus were admitted in 1909 and only one in the first five months of 1910. The Hindus represent the lowest grade of unskilled labor and are employed in saw and shingle mills, on railroads, and in salmon canneries. The average wage varies from 80 cents to $1.25 a day; the Japanese get $1 to $1.75 and whites $1.75 and over for the same kind of work.

Exclusion of Chinese, Japanese, and Hindus, and other Asiatics is practically secured in Australia by a provision in her immigration laws requiring immigrants to pass a "dictation test" in a European language. The total population of Asiatic races in 1911 amounted to 36,442, or 0.82 per cent of the total population; 20,600 of these are Chinese, 6600 are from British India, and 3500 are Japanese. They form an insignificant part of the population except in the Northern Territory, where 43 per cent are Asiatics. Among the 140,251 immigrants in 1913 there were 822 Japanese and 187 Hindus, showing that the exclusion is not absolute.

The Hindu immigration problem has assumed serious proportions in Natal and in the other South African colonies. The number of indentured East Indian immigrants arriving at Natal averaged about 7000 per year from 1900 to 1907; it fell off to 2487 in 1909, but rose to nearly 8000 in 1910 and 1911. The population of Natal in 1911 included 99,000 whites, 452,000 natives, and 142,000 other colored, of whom most were probably Hindus and Chinese. Other colored showed a net increase of 34,000 since 1904. In the Transvaal and in Orange Free State their numbers are relatively small and in the former are on the decrease.

Difficulties in South Africa and Natal began when Hindus who had been working as forced or contract laborers wished to stay as residents or citizens. The qualities of extreme frugality and low standard of living and a willingness to work for an extremely small sum, which had induced employers to bring them in, aroused the hostility of labor when they desired to remain beyond their term of contract. Many disabilities were imposed on them. They were required to register, were segregated in railroad and street cars, a poll tax of $15 was levied on them, obstacles were placed in the way of their acquiring real estate, readmission was denied if they went to India on a visit, and the legitimacy of marriages under Hindu or Mohammedan rites was questioned. The fear of economic underbidding was the reason why the free Hindu laborers were not wanted. A campaign of passive resistance and strikes was carried on in parts of Natal where the Hindus were the most numerous; some riots occurred; bands of them formed to march out of Natal into other states of the Union and encounters took place between them and the constabulary. The Hindus demanded right of residence, of free circulation through the Union of South Africa, the abolition of the tax, and recognition of all monogamous marriages under Mohammedan rites in or out of South Africa. The treatment of the Hindus in South Africa aroused warm feeling in India.

Special provisions applying to Indian immigration were adopted in Portuguese and German East Africa.

There is a considerable East Indian immigration (of indentured servants) into Trinidad and Tobago, British Guiana, the Fiji Islands, and the Straits Settlements.

For the Chinese in the United States, see CHINESE IMMIGRATION.

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ORIENTAL POWDER. See EXPLOSIVES.

ORIENTAL REGION (Lat. *orientalis*, relating to the east, from *oriens*, pres. p. of *oriri*, to rise; connected with Gk. *ὀρνύναι*, *ornynai*, Skt. *ar*, to rise). A primary division in zoogeography, comprising southeastern Asia and the adjacent islands as far as Wallace's line. (See DISTRIBUTION OF ANIMALS.) This "small, compact, but rich and varied" region, according to Wallace, consists of all India and China south of the Himalayan highlands; all the Malay Peninsula and islands as far east as Java and Bali, Borneo and the Philippines; and Formosa. It is divided into four subregions: (1) Ceylonese, southern India and Ceylon; (2) Indian, from about Madras to the foot of the Himalaya; (3) Indo-Chinese, Burma and southern China; (4) Malayan, the peninsula of Malacca and the Malay and Philippine islands. The affinities between the Oriental and Ethiopian fauna have impressed naturalists strongly, and some have thought that India ought to be included in the latter region; but the weight of opinion seems to favor retaining the boundaries of the Oriental region as they were made by Wallace. Consult A. R. Wallace, *Tropical Nature* (London, 1878).

ORIENTAL SEMINARIES. The name applied to certain European institutions established for the purpose of training young men for diplomatic and mercantile positions in Oriental countries. In these schools instruction is given, partly by European scholars of acknowledged eminence and partly by native teachers, in the principal languages of Asia, Malaysia, and Africa, and in the geography, history, and civil and religious institutions of these countries. Practical instruction in modern European languages is also given, and lectures on law are usually added. With few exceptions they are under direct governmental control. The oldest institution of this sort is the Kaiserliche-königliche Consular-Akademie of Vienna, founded by the Austrian government in 1754 for the education of promising candidates for the diplomatic service. It is under the direction of the Ministry of Foreign Affairs, and embraces both an Oriental and a Western section. In addition to the regular courses of instruction the students, whose number is limited to 25, are trained in gymnastics, swimming, horsemanship, fencing, and other accomplishments. The Kaiserliche-königliche öffentliche Lehranstalt für orientalische Sprachen, established at Vienna in 1851, has a much wider scope and is open to all students looking forward to a career in the East, whether in a public or private capacity. Of similar character is the Ecole Spéciale des Langues Orientales Vivantes of Paris, founded in 1795, and now under the direction of the Ministry of Education. In this school special attention is paid to the languages spoken in the French colonial possessions in Africa and in the East. In Russia an Oriental department has, since 1854, been attached to the University of St. Petersburg, and courses are offered in the principal languages of Asia, including those of China, Korea, and Japan. The great extension, since 1870, of Germany's commercial interests in the East and the development of her colonial policy led to the establishment, in 1887, of the Seminar für orientalische Sprachen attached to the University of Berlin. Here the languages of eastern Africa are taught in addition to those of western Asia and the Far East. In England instruction in modern Oriental languages has long been given at the University of Cambridge, and in London the School of Modern Oriental Languages, now incorporated with the University of London, has been in successful operation for some years. Special attention is paid to the languages spoken in the Indian Empire. The School of Tropical Medicine, founded through the interest of the Hon. Joseph Chamberlain, and the Oriental Faculty of the College of the Propaganda at Rome (see MISSIONS, CHRISTIAN) may also be mentioned in this connection. Several of these institutions issue publications of much value. The government of the United States has, as yet, taken no steps towards the establishment of a school for Oriental studies, but instruction in modern Oriental languages is given in some of the leading universities. At Johns Hopkins University, Baltimore, courses in modern Arabic, Persian, and Turkish have been offered since 1891, and in the languages of the Philippine Islands since 1900. At Columbia University there is a chair of Chinese.

ORIENTAL SOCIETY, AMERICAN. One of the oldest learned societies in America, founded Sept. 7, 1842, and chartered under the laws of Massachusetts, with the object of promoting Oriental research in all its branches. It meets annually for the reading and discussion of papers and for the transaction of the general business of the society, and, by the terms of its constitution, at least one meeting in three years must be held in Massachusetts. The society possesses, at Yale University, a library comprising some 5000 volumes and a considerable number of manuscripts, and publishes a *Journal*, issued annually in two parts, which contains many valuable contributions to Oriental philology, history, and archæology. Among the presidents of the society, which has exercised an important influence on the development of Oriental studies in America and has made its influence felt in foreign countries as well, have been the well-known scholars Theodore Dwight Woolsey and James Hadley of Yale, the celebrated Sanskritist W. D. Whitney, the noted Daniel C. Gilman, once president of Johns Hopkins University, the eminent archæologist William Hayes Ward, of New York, one of the acknowledged authorities on the study of comparative religion, and Crawford H. Toy, of Harvard. Since 1910 there has been an annual rotation in the presidential office. In 1915 the society had a total membership of about 340.

ORIENTAL SORE. See KALA AZAR.

ORIENTA'TION. Determination of one's position with regard to the points of the compass, and in architecture the placing of a building in a particular relation to the east-west axis. In early antiquity it was felt that special efficacy attached to prayers made at dawn towards the rising sun; hence temples were placed with the entrance towards the east, so as to allow the first sunbeams to fall on the statue of the god, before which stood the altar. As the sun daily changes his place of appearance, choice might be made of his position at the time of the solstice or equinox. This is the usual orientation of Greek and Roman temples, although there are occasional exceptions. Most of the early Christian churches both in Rome and the Orient were built facing the east so that the priest, standing behind the altar, faced the congregation; but first in the Byzantine and later in the Roman churches a changed ritual obliged the priest and the congregation both to face the east, the priest standing between worshipers and altar. This necessitated reversing the former orientation, and nearly all churches since the sixth century have been built with entrance to the west and altar and apse at the east end. St. Peter's at Rome is a conspicuous exception, conforming to the primitive practice. Consult William Atkinson, *Orientation of Buildings* (New York, 1912). See EAST END.

ORIENTATION. A term, belonging partly to psychology and partly to physiology, which signifies a normal adjustment of the organism to its spatial environment. We are orientated when we can govern the position of our body (stand up, sit down) with reference to changing spatial requirements and when we have our bearings as motor organisms, knowing right from left, and being able to move in any required direction. Orientation thus covers the maintenance of bodily equilibrium and the control of locomotion. The factors that determine it are manifold and are both sensory (psychological) and reflex (physiological). We may mention sensations of vision, sensations from skin, joints, and muscles of limbs and trunk — e.g., sensations from the soles of the feet, from the weight of the trunk pressing the hip sockets — reflexes of the eye muscles (attended in certain circumstances by muscle sensations), tactual and visual reflexes, and above all the sensory and reflex mechanism of the semicircular canals and vestibule of the internal ear.

(See Static Sense.) As a rule orientation is unconscious or at best but dimly conscious. Removal or derangement of any important factor, however, brings it definitely to consciousness: the effect of anæsthetizing the soles of the feet is very marked, and we all know the difficulty of keeping the head erect when we become drowsy. The governing reflexes may be disturbed by drugs, as in alcoholic intoxication; and in various forms of mental disorder the power of orientation is more or less completely abrogated.

Animals, in orientating themselves, are guided by their senses and thus have the sense of direction. (See Tropism.) The dog finds his food mainly by the sense of smell, and this more than any other sense leads animals in their quest for food to move from one place to another. The sense of direction may also include the phenomena of migration and the homing instincts of animals and the wonderful power exercised by savages and hunters in finding their way through a trackless forest or desert.

By means of the sense of touch we direct our attention to any part of our body which may receive a blow or any impression from without. The existence of a muscular sense is denied by Bonnet, who, however, calls in the existence of what he calls a sense of segmental attitudes, which is the faculty we possess of knowing how instantly to orientate any single part of our body in relation to all the others. It is a primitive attribute of the tactile sense.

The tactile sense is the most generalized of all the senses, and tactile organs are to be found in all animals, in the shape of hairs, bristles, tentacles, and feelers of various sorts. The skin is especially sensitive to touch. Many of the lower and blind animals feel their way, as in the case of earthworms, the maggots of flies, and eyeless myriapods. In mollusks Nagel has found that certain eyeless bivalves and snails he experimented with showed a high degree of sensitiveness to light; some species reacted especially to diminution, others to increase, of light.

The marginal tentacles of certain medusæ (q.v.), besides being organs of touch, also contain minute calcareous bodies (otoliths); in other medusæ corresponding organs have grown in or become invaginated, forming marginal sense organs. The otoliths may either be situated at the end of a stalk or remain free in the cavity containing them, which is called an otocyst. These otocysts are organs of the sense of attitudes and of movements, and they also aid in directing the movements of the body in approaching their prey or in escaping from their enemies.

Other kinds of organs of orientation which have excited much interest are the lateral organs of salamanders, of which some contain otoliths, while those of the lateral line of fishes open externally or are closed. These organs, which occur only in aquatic animals, are supposed to afford a perception of variations of water pressure and have by some been thought to be the organs of a sixth sense. They occur on the head and also along the side of the body. Like the marginal organs of medusæ they tend to be invaginated and to form in their interior a liquid medium in which the movements peculiar to the animal may determine variations in pressure or of true friction between the sensible wall and the refractory liquid mass, by its fluidity and inertia immediately following the movement of the wall. These beatings or vibrations, impinging on the walls of the otocyst and causing movements of the delicately poised otolith, are the functional mode which takes place in the action of the canalicular structures (lateral canals, labyrinth) from which have evolved the ear of fishes and other vertebrates. Instead of a series of sensorial papillæ more or less salient or invaginated, we find first a furrow, then a lateral canal, still in places in communication with the liquid exterior and along whose wall may be distributed the papillæ of the lateral sense. We actually find in the otocyst of cephalopods furrows which are regarded as the precursors of the canals of the labyrinth of the ear, so that this sort of otocyst may be regarded as the prototype of the labyrinthine structures of vertebrates. But in the latter the organ of the lateral line is greatly developed. Each organ is an ectodermic papilla which has become invaginated and sunk down into the skin, whose growth converts the organ into a closed otocystic vesicle, in whose walls are new ingrowths of secondary papillæ with bent furrows formed like the furrow of the lateral line. These become curved canals comparable to canals of the lateral line, and produce an analytic decomposition of the slightest vibrations between the walls and the contained inert fluid, each furrow, each canal being very sensitive to the vibrations in one direction and insensible to all the others. The pairs of sensitive cranial nerves sent to the lateral organs are the fifth, seventh, ninth, tenth, then the lateral continues. The eighth pair is wholly supplied to this marvelously differentiated lateral organ, which becomes the labyrinth of the fish's ear. In all the higher vertebrates the labyrinth of the ear consists of three canals, a sagittal, a transversal, and a horizontal one. Bonnet concludes by saying that in man the labyrinth of the ear, i.e., the apparatus of the semicircular canals, furnishes the notion of attitudes and of variations of attitudes of the head, together with a notion of the swiftness, direction, and duration of these variations. Moreover, it is not sufficient to know from what direction any sound reaches either of one's ears; it is also necessary for one to know the orientation of the two auditory fields, i.e., the position of one's head at this time, so as objectively to orientate the origin of the sound.

Some authorities (Crum-Brown, Lloyd Morgan) believe that by means of the semicircular canals we can appreciate acceleration of rotatory motion and also acceleration of movements of translation — forward or backward, up or down — while Morgan suggests that otocysts of invertebrates may be regarded as organs for the appreciation of changes of motion, "and the sense of hearing may be a refinement of the sense through which changes of motion are appreciated."

Consult: Pierre Bonnier, *L'Orientation* (Paris, 1900); Fritz Hartmann, *Die Orientierung* (Leipzig, 1902); Jacques Loeb, *Comparative Physiology of the Brain, etc.* (New York, 1902); J. B. Watson, *Behavior* (ib., 1904); also Stratton, "Cutaneous Sensation," in *Psychological Review*, vol. iv (ib., 1897).

ORIFLAMME, ôr'ĭ-flăm, or **AURIFLAMME** (Fr., from ML. *auri flamma*, from Lat. *auri flamma*, flame of gold). A banner which originally belonged to the abbey of Saint-Denis, near Paris, and was borne by the counts of Vexin, patrons of that church, but which, after the County of Vexin was united with the French crown, became the principal banner of the Kingdom. It was charged with a saltire wavy, or with rays issuing from the centre crosswise. In later times the oriflamme became the insignia of the French infantry. The name seems also to have been given to other flags; according to Nicolas, in his *History of the Battle of Agincourt* (London, 1827), the oriflamme then borne was an oblong red flag split into five parts. It does not seem to have been carried into war later than this battle (1415), when it fell into the hands of the English.

ORIG'ANUM. An herb. See MARJORAM.

OR'IGEN (Lat. *Origenes*, from Gk. 'Ωριγένης, probably son of Horus, an Egyptian god), also called ADAMANTIUS (c.185–c.254). The most famous Christian writer and teacher of the third century. He was born in Alexandria about the year 185. His parents were Christians and his father, Leonidas, suffered a martyr's death under Septimius Severus (202). Origen would gladly have died with him had he not been prevented by his mother. The boy was educated at the famous Alexandrian School, where he had Clement as his master. His remarkable abilities were early manifest and at the age of 18 he was appointed to succeed Clement as head of the catechetical school. In obedience, as he supposed, to the command of Matt. xix. 12, Origen made himself a eunuch, and his daily life was governed by an extreme asceticism. Leaving Alexandria during the persecution under Caracalla (216), he traveled widely, visiting Jerusalem and Cæsarea, where, at the invitation of Bishops Alexander and Theoctistus, he lectured on the Scriptures, although he had not been ordained. This called forth a rebuke from Demetrius, Bishop of Alexandria, who summoned him to return home. For several years Origen devoted himself assiduously to teaching and writing, his reputation increasing rapidly. Jerome says that he wrote more books than other men can read, and Epiphanius places their total number at 6000. About 218 he had come under the patronage of Ambrose, a wealthy Alexandrian, who supplied him with stenographers and copyists. Paying another visit to Palestine in 231, Origen was ordained presbyter by Alexander and Theoctistus, which aroused the bitter animosity of Demetrius. Jealousy mingled with other motives in magnifying the suspicions of heresy which some entertained against him, and two synods were held in Alexandria (231 et seq.), at which he was deposed from the priesthood and forbidden to return. The churches of Palestine, Phœnicia, Arabia, and Achaia refused to recognize his deposition. Henceforward, except for occasional journeys, Origen resided in Cæsarea, where he succeeded in raising the school of that place almost to the height of fame which Alexandria had reached. During the persecution of the Emperor Decius (250 et seq.) he was imprisoned and tortured, and although he was released on the death of the Emperor, he died from the effects of his injuries about 254, being then in his seventieth year. Tradition placed his death and burial at Tyre, but this is not certain.

Origen was the greatest theologian and biblical scholar the Church up to that time had produced. He is sometimes called the father of the allegorical method of interpreting the Scriptures, for although the method did not originate with him, yet he, with Clement, perfected its Christian application and gave it a far larger currency than it had ever had before. He taught the principle of the threefold sense, corresponding to the threefold division of man into body, soul, and spirit, which was then so common. As an exegete and student of the text Origen did far greater service. In his *Hexapla* (q.v.) he presented the Old Testament in the original Hebrew, with a Greek transliteration, and the Greek versions of the Septuagint, Aquila, Symmachus, and Theodotion, all arranged in six parallel columns. His exegetical work was partly in the form of homilies, on both the Old and the New Testament, and partly in that of *Tomoi*, or commentaries in the stricter sense of the term, which covered a wide range. His theology was presented to the world in a treatise entitled Περὶ 'Αρχῶν, known to us in its completeness only in a Latin version made by Rufinus and entitled *De Principiis*. Unfortunately Rufinus felt called upon to alter the text wherever it seemed to him heretical, so that what we have is not a translation but a modified Latin version. Origen's theological views are further illustrated in his long apologetic work, *Against Celsus*, which is on the whole the most important Greek apology we possess. Like Clement, he was a Platonist and strove to combine Greek philosophy and the Christian religion.

Origen's greatest service to Christian doctrine lay in his development of the Logos Christology. In Jesus Christ we learn to know the Incarnate Word (Logos). But from this conception, through speculative thought, we rise to that of the Logos not Incarnate, or the Preexistent Logos, through whom in turn we mount to God Himself, the goal of all theology. To preserve the idea of God as absolute and eternal, whatever is closely related to Him—as the Son is and as the creation is—must be pictured to our minds *sub specie æternitatis*, from the point of view of eternity or infinity. It is wrong to think of Christ as an emanation from God (the Gnostic doctrine), for that involves succession in time. We should rather think of him as eternally projected. To illustrate his thought Origen used the metaphor of a torch and its light, or a mass of iron glowing with heat. In this fashion he avoided the two perils of Gnostic emanation on the one hand and Monarchian identification on the other. (See GNOSTICISM; MONARCHIANS.) But while teaching that the Son was eternally begotten, a doctrine which was perpetuated in the dogma of the Trinity, Origen also taught that the Son was subordinate to the Father in power and dignity, and this idea was later used against him, after Arianism (see ARIUS) had appeared as a threatening heresy. Origen's doctrine of an eternal creation, with periodic cycles of decay and renewal for our world, was not generally accepted by the Church. Nor was his restorationism accepted, according to which all mankind should at last return to a state of innocency and be acceptable unto God, although something like it was afterward taught by Gregory of Nyssa in the fourth century. The school of Origen, which included Dionysius of Alexandria, Gregory Thaumaturgus, Eusebius of Cæsarea, John of Jerusalem, Jerome (in his early period), and others, was very influential for many years, but in the fourth century it was attacked by Epiphanius, and the Origenists were thenceforward regarded as heretics and combated fiercely.

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ORIGINAL PACKAGE (OF., Fr. *original*, *originel*, from Lat. *originalis*, original, from *origo*, origin, from *oriri*, to arise; connected with Gk. *ὀρνύναι*, *ornynai*, Skt. *ar*, to arise). In American constitutional law, the package in which goods are shipped from one State to another. The term has a special significance arising out of a line of decisions of the United States Supreme Court as to questions raised by the attempts of the various States to prohibit or regulate the sale of intoxicating liquors, cigarettes, and other commodities on the ground that they were injurious to public health and morals. The cases in which these questions were decided are known as the Original Package Cases. The interstate commerce clause of the United States Constitution provides that Congress shall have power "to regulate commerce with foreign nations and among the several States." Any State has the right, in the exercise of the police power, to regulate the domestic manufacture and sale of commodities, and, accordingly, in the so-called prohibition States the manufacture and sale of intoxicating liquors were practically prohibited. This led to the importation of liquors from other States and to seizure by the State officers. The United States courts held that where an article is imported into one State from another it does not lose the protection of the interstate commerce clause until it has become intermingled with and incorporated into the general mass of property of the former, and that this does not happen so long as goods remain in the original packages, cases, barrels, etc., in which they have been shipped and while still in the hands of the importer. The importance of these decisions lies in the fact that such an interpretation of the law gives ample opportunity to evade State laws through the device of selling goods in the original packages directly to consumers. The State law operates only to prevent or render illegal the sale of the goods by the importer. Even this power was nullified by a liberal interpretation of the expression "original package," liquor in bottles being held to come under that description and so capable of transfer in that form. However, if the bottles were inclosed in a case, the latter would be the original package, and the importer could not retail the bottles without conforming to the State laws. An original package was finally defined to be any covering, case, wrapping, or receptacle in which an article is inclosed for transportation.

These decisions created great dissatisfaction as a vexatious interference with the internal economy of the several States, and as a result Congress in 1890 passed the act known as the Wilson Law, which provided that all intoxicating liquors imported into a State shall on their arrival be subject to the laws and regulations of that State enacted in the exercise of its police power, in the same manner as if they were produced there, and shall not be exempt by reason of having been introduced in original packages. The purpose of this law was declared by the United States Supreme Court to be to prevent the sale of liquor in original packages in violation of State laws, and it effected a radical change in the law in this respect. However, a number of decisions have held that such State regulations must be strictly confined to the police powers of the State, such as requiring liquors to be sold within certain hours, etc. A license tax on imported liquors in original packages or otherwise, which seemed to have no other object than to provide revenue for the State, was held void as being a tax on interstate commerce.

The law as to all other commodities in original packages remains the same as before the above act, and is still of great importance in its bearing upon laws prohibiting the sale of cigarettes, etc. See INTERSTATE COMMERCE.

ORIGINAL SIN. The native corruption of man, resulting in universal sin and itself conceived as partaking of the nature of sin. The period of elaborate discussion of this subject, resulting in a comprehensive doctrine of sin, fell in the first third of the fifth century, but the doctrine had been growing up from the early Church. A difference appeared between the Latin and the Greek church on account of the general emphasis which the latter laid upon the intellectual and the former upon the practical. The Greeks emphasize more the freedom of man, the Latins his practical bondage to evil. It has therefore often been said that the Greeks had no doctrine of original sin; but they teach an original state of righteousness, accept the fact of the fall, and view this as not only bringing man under the dominion of the devil but as producing a tendency to sin. This tendency arises from the obscuration of the intellect, the weakness in reference to the good, and the ascendancy of the sensuous nature over the higher powers and faculties, which have resulted from Adam's sin. At the same time men are not held guilty of Adam's sin and freedom is carefully guarded, the more so because of the conflict which these early fathers were waging with the Gnostics. (See GNOSTICISM.) Man still has the power to choose the good as well as the evil. Otherwise he would not be responsible. Grace is necessary to repentance, but it is styled an assistance. Origen referred the universality of sin to the self-corruption of all human spirits in a previous state of existence. The Latins, while in general acknowledging the same fundamental truths as the Greeks, throw the emphasis upon the concrete facts of sin and grace. Tertullian approached the later Latin view. The premises of the doctrine lie in his psychology (see Traducianism) and his doctrine of the original condition of man. Man was created good, but not perfect. By his sin he became corrupt, and this corruption propagates itself by natural generation among his descendants. Hence every child of Adam is impure and subject to death. Grace is no mere assistance, but it is a creative and transforming power. In this position the Latin fathers of this period generally concur.

The discussion was carried on in the fifth century by Pelagius and Augustine (qq.v.). The main positions of the latter were embodied in the result of the Council of Orange (529), which declared that by the sin of Adam free will has been so perverted and weakened that fallen man is incapable, without the initiative of divine grace, of performing meritorious acts leading to salvation. The philosophical ground for Augustine's position lay in a realism which regarded human nature as a whole completely corrupted in the sin of Adam. A milder view sprang up immediately, which was termed Semi-Pelagianism (q.v.), which gave the initiative in conversion now to man and now to God, and hence greatly modified the doctrine of the effect of the fall upon the will. The doctrines of the Semi-Pelagians were condemned at the Council of Valence (530). The Council of Trent (q.v.) defined original sin in substantially the same way as the Council of Orange, but elaborated and expanded it, and its definition is the accepted doctrine of the Roman Catholic church.

The reformers adhered to the strict Augustinian doctrine, often surpassing Augustine by their extreme forms of statement. They were deeply impressed with the enormity and pervasiveness of sin and with the entire dependence of man upon the grace of God for the creation within him of the least tendency towards good. The Calvinistic churches expressed the doctrine with more vigor than the Lutherans. The history of the doctrine presents little but the reaffirmation of Augustinian positions, and may be summarized in the result formulated by the Westminster Confession (chap. vi), which stands here for the most of the Reformation creeds: "Our first parents . . . by this sin . . . became dead in sin and wholly defiled in all the faculties and parts of soul and body. . . . The guilt of this sin was imputed and the same death in sin and corrupted nature conveyed to all their posterity. . . . This corruption of nature during this life doth remain in those that are regenerated; and although it be through Christ pardoned and mortified, yet both itself and all the motions thereof are truly and properly sin." The philosophical ground for the guilt of original sin in realism having disappeared, the federal theology (q.v.) attempted to furnish another in the theory of a covenant of God with Adam, but this was not accepted by all Protestants. The Arminians held that the inclinations to evil inherited from Adam do not in themselves involve guilt. (See Arminianism.) Wesley held that men are implicated in the guilt of original sin, but not to deserve eternal damnation. The New England theology (q.v.) began with the defense of the most rigid form of the doctrine in Jonathan Edwards's *Doctrine of Original Sin Defended* (1755), on the ground that God had decreed the personal identity of the human race with Adam, whence follows the guilt of original sin. Dwight, Taylor, and later theologians of the school, however, rejected the imputation of the guilt of Adam's sin; man is only guilty of his own sin, yet Adam's sin has corrupted his nature so that he is sure to sin. Later German theology, as Rothe and Ritschl, also rejected the transmission of sin by heredity or imputation. Present theology rejects alike Augustinian realism and the federal theory of covenants, and with them the doctrine of guilt for ancestral sin. It hands over the question of the transmission of evil inclination to be treated with the general problem of heredity. While holding that universal sin is a fact of human experience, it retains little that the older theology would regard as a doctrine of original sin.

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ORIGINAL WRIT. In English legal practice, a writ issued under the great seal and directed to the sheriff, requiring him to command an alleged wrongdoer to satisfy the complaint of his accuser or to appear in court and answer the complaint. These writs were formerly regarded as the direct mandate of the King (whence the name) issued through his chancellors; but they have been abolished in England, where the statutory process of summons is used to begin all civil actions. In the United States they have never been in use. The term is sometimes improperly given to the first writ or process issued in an action under the modern procedure, which is not an original writ but a process of the court. See Procedure; Writ.

ORIGIN OF SPECIES. See Darwin, Charles; Natural Selection.

ORIGNAL, ō'rē'nyäl' (probably of North American Indian origin). A French-Canadian name for the moose (q.v.).

ORIHUELA, ō'rē-wä'lȧ. A very ancient city of southeast Spain in the Province of Alicante (Map: Spain, E 3). It is situated 14 miles northeast of Murcia, on the banks of the Segura, in a plain remarkable alike for its beauty and fertility. It is a long and straggling city. Its palm trees, square towers, and domes give it an Oriental appearance. It contains a small Gothic cathedral and a handsome bishop's palace. The manufactures include silk, linen goods, and hats; flour and oil mills and tanneries are in operation. Pop. (commune), 1900, 28,335; 1910, 35,072.

ORIL'LIA. A town and summer resort of Simcoe County, Ontario, Canada, on the Grand Trunk, Canadian Northern, and Canadian Pacific railways, at the head of Lake Couchiching, 86 miles north of Toronto (Map: Ontario, F 4). The town has an opera house, a collegiate institute, a provincial asylum for the insane, and a Carnegie library. The industrial establishments include clothing factories, smelting and refining works, saw and planing mills, and manufactories of wood specialties, oxyoline, boats and canoes, hoops, hardware, furniture, automobiles, wagons, cement, carriages, farm implements, pumps, etc. The United States is represented by a consular agent. The town owns its electric-lighting system and water works. Pop., 1901, 4907; 1911, 6828; 1915 (local est.), 7800.

ORIL'LON (Fr., almonds of the ears, from *oreille*, ear, from Lat. *auricula*, dim. of *auris*, ear). A term used in the earlier systems of fortification to describe a semicircular projection of the shoulder of a bastion, the projection being designed as a screen for guns and men posted on the flank.

ORIN'DA, THE MATCHLESS. See PHILIPS, KATHARINE.

ORINOCO, ō'rē-nō'kō. The smallest of the three great rivers of South America (Map: Venezuela, D 2). The main stream runs wholly within Venezuelan territory, except for a short distance in its middle course, where it forms the boundary between Venezuela and Colombia. It rises on the Parima uplands near the Brazilian frontier, and flows first northwest to the Colombian boundary, then north into central Venezuela, and finally eastward until it empties into the Atlantic Ocean through a large delta beginning about 130 miles from the sea. The total length of the main stream is 1490 miles. Its course forms a large curve around the edge of the Parima plateau; hence its right banks are generally higher and the tributaries received from that side smaller, while on the left side are the large plains or *llanos* (q.v.), and through these are received several tributaries equaling or exceeding the main stream. About 150 miles from its source and 920 feet above sea level the Orinoco branches, sending one-sixth of its volume into the Cassiquiare, which flows into the Río Negro, an affluent of the Amazon. It then flows as a navigable river until it is broken by the romantic Maipures and Atures rapids, 870 miles from its mouth. These rapids are the only serious obstruction in the main stream, which below them flows with a very gentle current over a bed so nearly level that the tides are felt at Ciudad Bolívar, 260 miles from the sea. Though the country around the upper courses of the river and its tributaries is heavily forested, the lower reaches traverse open savannas where only the banks are lined with trees and where the adjacent country is periodically flooded so that the natives are compelled to live in pile dwellings. The marshy but heavily forested delta occupies an area of 7000 square miles and has a coast line of nearly 200 miles, through which upward of 50 channels enter the ocean. Many of these shift their beds, but seven are permanently navigable for large vessels. The principal navigable tributaries of the Orinoco are the Guaviare, the Meta, and the Apure (qq.v.), and the total navigable length of the system is 4300 miles. This great waterway, however, is but little used, since the adjacent regions are thinly inhabited and the great natural wealth practically untouched. A weekly steamship service is maintained during the busy season between Trinidad and Ciudad Bolívar. Smaller steamers continue the service as far as Nutrias on the Apure, but above the Apure confluence there is no regular navigation. Consult: Alexander von Humboldt, *Travels in South America*, translation in Bohn's Library (London, 1877); S. P. Triana, *Down the Orinoco in a Canoe* (London, 1902); Guzmań, "La exploración del Orinoco," in *La España Moderna*, vol. clxvi (Madrid, 1902); H. J. Mozans, *Following the Conquistadores: Up the Orinoco and Down the Magdalena* (New York, 1910).

O'RIOLE (OF. *oriol*, from Lat. *aureolus*, golden). Any of several small birds whose plumage is yellow or orange and black. It was given first to the Old World family Oriolidæ, and was naturally transferred to the American hangnests by early English travelers and settlers on account of the similarity in colors. The American orioles belong to the family Icteridæ and form the subfamily Icterinæ, in distinction from the blackbirds, bobolinks, and meadow larks, from which the orioles differ in the extremely acute, sometimes decurved bill, comparatively weak feet, and nongregarious, arboreal habits. They are agreeable songsters, possess notably handsome plumage, and are renowned as architects. As their nests are usually pensile, the birds are often called hangnests. They are especially characteristic of tropical America, where they go by the name of caciques, or, in Jamaica, banana birds. The best-known species is the Baltimore oriole (*Icterus galbula*), which ranges in summer as far north as the southern provinces of Canada, but winters in Central America. Its name was given to it by Linnæus, whose first specimen came from Maryland, in complimentary allusion to the fact that the colors of the male were those of the livery of Sir George Calvert, the first Lord Baltimore, then proprietor of that Colony. The gay plumage has also caused it to be called golden robin, firebird, and fire hangbird. The male is about 8 inches long, brilliant fire orange, with the whole head, neck, back, wings, and middle tail feathers black, and with considerable white on the wings. The female is somewhat smaller, much paler, and with the black more or less obscured by olive. The young resemble the female and do not assume their full plumage before the second year. The Baltimore oriole is one of the most conspicuous birds that the spring migrations bring into the northern United States, not merely because of the splendor of his plumage but also because of his loud, musical whistle. The food consists chiefly of insects, although fruit and young peas and similar delicacies are eagerly accepted when in season, and ripening grapes are injured to a serious extent in the Hudson valley and certain other localities. See Colored Plate of SONG BIRDS with THRUSH.

The nest of the Baltimore oriole (see Plate with NIDIFICATION) is the bird's greatest claim to distinction. This admirable structure is woven into the tip of a branch, preferably the drooping limb of an elm or willow, from which it hangs at some distance from the ground; though other trees are frequently used, the elm is the favorite, as the long, drooping branches afford an ideal location for a hanging nest. The construction of the nest is mainly if not entirely the work of the female, the principal materials being grass, slender strips of bark, strings, hair, and vegetable fibres. These are all closely and very firmly interwoven into a pouch 4 or 5 inches in depth. The eggs are four to six in number, not quite an inch long, white, spotted, scrawled in a curious manner with irregular lines of black or brownish.

Another oriole, which does not range quite so far north or west as the Baltimore, and which is much less conspicuous, though the male is very handsome, is the orchard oriole (*Icterus spurius*). A much quieter and more retiring bird than his showy cousin, the orchard oriole is not so often seen or heard, but his song is a more finished product and more melodious. The male is chestnut, with the head and fore parts of the body black, while the female is olive green and dull yellow. The young resemble the female, and the males do not assume full plumage until the third year. The nest is made of grasses and is not so perfectly pendent as is the Baltimore oriole's. The eggs are similar to those of the latter, but are somewhat smaller and not so much scrawled. (See Plate of EGGS OF SONG BIRDS.) Of the remaining 35 or 40 species prominent examples are the troupial (*Icterus icterus*), a tropical species common in South America, about 10 inches long, bright yellow and black; the black-headed oriole (*Icterus melanocephalus*), another large, rich yellow and black species, occurring in Mexico, a variety of which, known as Audubon's oriole, is found in the lower Rio Grande valley; and Bullock's oriole (*Icterus bullocki*), a species very similar to the Baltimore bird, which replaces that species in the Far West. See also CACIQUE, a closely allied group.

The orioles of the Old World are a small family of about 40 species, the Oriolidæ, related to the crows. They are characteristically Oriental and Australian, though several species occur in Africa and one ranges throughout Europe. This is the golden oriole (*Oriolus oriolus*), somewhat larger than the Baltimore oriole and equally brilliant. The song is marvelously rich and flutelike, but very short. A very similar Oriental species is the familiar *Oriolus kundoo*, or mango bird. The outward likeness between these Old World orioles and the American hangnests is increased by the fact that the former also build somewhat pensile nests. The mimicry between them and certain honey eaters (Meliphagidæ) is another very interesting circumstance, described at length by Wallace, Newton, and Salvadori. Consult: A. H. Evans, *Birds* (London, 1900); Robert Ridgway, *Birds of North and Middle America*, part ii (Washington, 1902); F. H. Knowlton, *Birds of the World* (New York, 1909); and all general handbooks and manuals.

ORI'ON. An ancient constellation lying on the celestial equator to the southeast of Taurus. It is mentioned in both Homer and the Bible (Job ix. 9; Amos v. 8). It was supposed by the ancients to represent the hunter Orion wearing a lion's skin and a belt and carrying a club and a sword. It is the most brilliant of the constellations. Its principal stars are: α Orionis, or Betelgeux, a star of ruddy hue, which varies in magnitude from 1 to 1.4; β Orionis, or Rigel, of magnitude 0.3; γ Orionis, or Bellatrix, of magnitude 1.7; and κ Orionis, of magnitude 2.2, forming an upright quadrilateral, while δ, ϵ, and ζ Orionis, three stars of the second magnitude, situated in a diagonal line running from northwest to southeast across the middle of the quadrilateral, form the belt of the hunter. In addition there are upward of 40 stars of the fifth magnitude or brighter. σ Orionis, of magnitude 3.7, was resolved by Sir William Herschel into a pair of treble stars. Just below the belt is situated the famous Orion nebula, which is faintly visible to the naked eye, but which, in a telescope of high magnification, is found to extend its ramifications through the entire constellation.

ORION (Lat., from Gk. 'Ωρίων). In Greek legend, a giant hunter. In Homer Orion appears as the name of a constellation, conceived as a hunter who is watched by the constellation known as the Bear, and as the name of a handsome hero, beloved by Eos and slain by Artemis, but there is no hint of connection between the two stories. Later writers preserve a multitude of local legends about Orion, which cannot be united into a consistent narrative. In Bœotia he enjoyed special fame, as a hunter of mighty strength, who, while reputed son of King Hyrieus, was borne from the earth by the intervention of three gods. A Cretan version made him the son of Euryale, daughter of Minos, and Poseidon, who gave him the power of traversing the sea. Here also he appears as a hunter and a chosen companion of Artemis and Leto. The Chians connected him with their local hero Œnopion, for whose daughter Merope he became a suitor. Here too he, with the aid of Artemis, cleared the land of wild beasts, but Œnopion still refused to give him his daughter, and finally by strategy blinded him, according to one version, because Orion in drunkenness had offered violence to Merope. Orion forced a boy to guide him to the rising sun, whose rays, falling full upon his eyes, restored their sight. According to another story he was helped to this cure by Hephæstus, and returned to take vengeance on Œnopion, who was saved by Poseidon. From the Homeric story of his death was developed a series of stories of his love for Artemis which asserted that she slew him when his passion became too violent, or that she loved him and killed him only by accident, for Apollo, in his anger at her love, challenged her to hit a black spot on the sea; she shot her arrow and found only too late that it was the head of her lover, who was swimming. In general these myths seem to have no connection with the constellation, but in the following it is difficult not to see astronomical origin. Orion in Bœotia met Pleione and her daughters and pursued them for five years till they were caught up into the sky as the Pleiades, who still seemed to flee before the giant. In Crete Orion boasted that he would kill all beasts upon the earth, whereupon Gæa sent a scorpion, who killed the hunter by stinging his heel. Artemis set both in the sky, and Orion still hastens to set as he sees the scorpion appear above the horizon. Consult the article "Orion" in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (Leipzig, 1897–1909), and Otto Gruppe, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906).

ORIS'KANY, BATTLE OF. In American history, a battle fought about 2 miles west of Oriskany, N. Y., on Aug. 6, 1777, during the Revolutionary War, between about 800 American militiamen under General Herkimer (q.v.) and an equal force of Loyalists and Indians under Sir John Johnson (q.v.) and Joseph Brant (q.v.). The Americans, while on their way to relieve Fort Schuyler (on the site of Rome, N. Y.), fell into an ambuscade in a deep ravine, but fought Indian fashion and with the utmost bravery for several hours, and finally drove the enemy from the field. The battle greatly crippled St. Leger (q.v.), who soon afterward, alarmed at the approach of Gen. Benedict Arnold, rapidly retreated into Canada, thus abandoning the plan of campaign which had been drawn up by General Carleton and which provided for his effecting a junction with General Burgoyne and General Howe or General Clinton at Albany. In proportion to the numbers engaged it was one of the bloodiest battles of the war, more than a third of the contestants on each side being killed or wounded. General Herkimer was mortally wounded early in the action and died several days later. Consult W. L. Stone, *Life of Joseph Brant, Including the Indian Wars of the American Revolution* (New York, 1838), and Oneida Historical Society, *Memorial of the Centennial Celebration of the Battle of Oriskany* (Utica, 1878).

ORISKANY STAGE. A division of the Lower Devonian, named from the type occurrence at Oriskany, N. Y. It is found in the central and eastern parts of New York and extends southward along the Appalachians into Virginia. It attains a thickness of 200 feet in many places and consists largely of coarse sandstones and calcareous shales. The formation is of economic importance in Virginia, where it yields iron ore. See DEVONIAN SYSTEM; GEOLOGY.

ORIS′SA (Skt. *Odra*). A former kingdom on the east coast of Hindustan, which extended from Bengal, a part of which it included, on the north to the banks of the Godavari on the south, and from the coast on the east to Gondwana on the west. The term Orissa means the country in which the speakers of the Oriyā dialect form the dominant people. (See URIYA.) The authentic history of Orissa begins with the foundation of the Kesari, or Lion, dynasty, about 474 A.D. The Hindu rulers of the land were always Brahmanical rather than Buddhistic in religion, and they possessed a high degree of culture and civilization. Orissa maintained its position as an independent monarchy till the sixteenth century, when the Mohammedans began to harass the country. Finally, in 1568, the last independent King of Orissa was defeated by Soleiman, the Afghan King of Bengal, under the walls of Jaipur, and in 1592 the Afghans in their turn were forced to surrender Orissa to Akbar, and it remained a portion of the dominions of the Great Mogul until 1751. In 1742 the Mahrattas began wresting the country from the declining power of the Mogul emperors, and in 1751 Orissa became a Mahratta province. The Great Mogul ceded his rights to the East India Company in 1765. Under the Mahrattas the condition of the country was wretched in the extreme, and in addition to the distress caused by their lawlessness Orissa was ravaged by famine in 1770 and again in 1777. In 1803 the Mahratta power was crushed and Orissa became an English possession. Revolts took place in 1804 and in 1817–18. An agreement was made between the East India Company and the native chiefs and princes by which the former bound themselves to perform certain services for the country, while the latter engaged to pay a yearly tribute. Of the many principalities into which Orissa was divided a large number fell into arrears with the government, and the result was that numbers of the estates were sold and the government, as a rule, became the purchaser. Much of the territory originally forming a portion of this kingdom thus fell into the hands of the British. In 1865–67 a terrible famine visited the country. The British provinces of Behar and Orissa (q.v.) have an area of 83,181 square miles, and the native states of Behar and Orissa embrace an area of 28,648 square miles. The British provinces had a population, in 1901, of 33,242,783; 1911, 34,490,084. The native states had, in 1911, 3,945,209 people. The hill districts, which nowhere present an elevation of more than 3000 feet, are inhabited by the Gonds, the Koles, the Sourahs, and the Khonds. The irrigation of a large portion of Orissa is provided for by an extensive and costly system of canals taken over by the government in 1868. The chief towns are Cuttack, the capital (pop., 51,364); Balasore (pop., 20,880), an important seaport; and the holy city of Puri (pop., 49,334). See SANTALS.

Consult: Rājendralāla Mitra, *Antiquities of Orissa* (Calcutta, 1875, 1880); W. Hunter, *Orissa* (London, 1872); Stirling, *Account of Orissa Proper or Cuttack* (Serampore, 1822; new ed., Calcutta, 1904); G. Toynbee, *History of Orissa from 1803 to 1828* (ib., 1873); *The Imperial Gazetteer of India*, vol. xix (new ed., Oxford, 1908).

ORISSA. See SANTALS.

OR′ITHY′IA (Lat., from Gk. *'Ορειθυια*, *Oreithyia*). In Greek mythology the daughter of the Athenian King Erechtheus. Boreas (q.v.) carried her off to Thrace, and she became the mother of Cleopatra, Calaïs, and Zetes.

ORIZABA, ō′rē-thä′bȧ (called by the Aztecs *Citlaltepetl*, star mountain) (Map: Mexico, K 8). The highest peak in Mexico and second only to Mount McKinley in North America. It is situated 65 miles west of the city of Vera Cruz. It is a beautiful symmetrical volcanic cone rising to a height of 18,250 feet. Its summit is covered with perpetual snow and in clear weather is visible from ships far out in the Gulf. Forests of oak and pine cover the lower and middle slopes, the former following upon the luxuriant tropical flora. The timber line is found at 13,500–14,000 feet. The summit crater, which is much smaller than that of Popocatepetl, is in a condition of full preservation, and from it at times issue sulphurous and other vapors. It was first ascended in 1848 by two American officers, Reynolds and Maynard.

ORIZABA. A city in the State of Vera Cruz, Mexico, situated 68 miles southwest of Vera Cruz, on the railroad between that city and Mexico (Map: Mexico, L 8). The town lies in a beautiful valley over 4000 feet above the sea and is partly surrounded by lofty mountains, among which towers the magnificent volcano of Orizaba (q.v.), 20 miles distant to the northwest. In spite of the high altitude the climate of the valley is tropical and especially subject to hot winds from the south. The houses are mostly one-storied. The greater part of the valley is occupied by sugar plantations, and Orizaba is an important centre of the Mexican sugar industry. Orizaba is the industrial capital of the state; its chief production is textile fabrics. It also has a brewery and several tobacco factories. Pop., 1910, 35,263. Orizaba was an ancient Indian town, and its present name is a corruption of the Nahuatl Ahauializapan, meaning "pleasant waters."

ORKHAN, ōr-kän′ (1279–1359). A Turkish sultan, son of Othman, founder of the Ottoman dynasty, whom he succeeded in 1326. He captured Brusa the same year and made it his seat of government. He organized the Empire, created a standing army, and formed the corps of Janizaries (q.v.). Orkhan married Theodora, a daughter of the Byzantine Emperor John Palæologus, in 1347. He won a footing in Europe (1356) and made extensive gains in Asia Minor. Orkhan may be considered one of the greatest generals of the dynasty. He was succeeded by his son Amurath I (q.v.). Consult Halil Ganem, *Les sultans ottomans*, vol. i (Paris, 1901), and Nicolaé Jorga, *Geschichte des osmanischen Reiches*, vol. i (Gotha, 1908).

ORK′NEY ISLANDS. A group of islands lying north of the mainland of Scotland, of which they constitute a county, and separated from Caithness by the Pentland Firth, 6¼ miles wide at its narrowest point (Map: Scotland, F 2). The group consists of 67 islands, of which 29 are inhabited, and upward of 20 rocky islets. The principal islands are named below. The area of the islands is 376 square miles. With the exception of Hoy, which is mountainous, the islands are generally low, with an irregular, partly rocky, partly sandy coast line. The highest hill is the Ward of Hoy, 1555 feet. The rocks are of the Old Red Sandstone formation, except a small granite district near Stromness. The climate is moist and temperate; average annual temperature 46°, winter 39°, summer 54°. The annual rainfall varies from about 28 inches on the east side of the isles to 37 inches on the west. The soil is fertile; the leading crops are oats and turnips, others of importance being barley and potatoes. The inhabitants also engage in cattle, sheep, and poultry raising and in fishing. Live stock, fishery products, poultry, and eggs are largely exported. The County of Orkney combines with the Shetlands to return one member to Parliament. The only towns are Kirkwall (q.v.), the county town, and Stromness, with a fine harbor admitting the largest vessels, both on Mainland island. The population of the islands in 1801 was 24,445; in 1851, 31,455; in 1901, 28,699; in 1911, 25,897. The principal islands, with 1911 population, are: Mainland (also called Orkney or Pomona), the largest island, 14,703; South Ronaldshay, 1732; Westray, 1668; Sanday, 1529; Stronsay, 1195; Hoy, 1082; Shapinshay, 713; Burray, 625; Rousay, 534; Eday, 508; North Ronaldshay, 436; Flotta, 357.

The Orcades (whence the modern adjective Orcadian) are mentioned by classical writers, but of their inhabitants almost nothing is known till the Middle Ages. They were probably of the same stock as the British Celts. From an early period, however, these islands were the resort of Norsemen, and in the tenth century they were ruled by independent Scandinavian jarls (earls), but in 1098 they were made subject to the Norwegian crown. In 1231 the Scandinavian feudal lords were succeeded by Scottish nobles under the overlordship of the Norwegian kings. In 1468 the islands were given to James III of Scotland as a security for the dowry of his wife, Margaret of Denmark. In 1590 Denmark formally resigned all pretensions to the sovereignty of the Orkneys. The present inhabitants are generally of Norwegian and Scottish descent. The antiquities include the remarkable standing stones of Stennis, the Maeshowe tumulus, and also an old Pictish fort.

Consult: Low, *A Tour through the Islands of Orkney and Shetland in 1774* (Kirkwall, 1879); J. R. Tudor, *Orkney and Shetland* (London, 1883); Buckley and Haure-Brown, *Vertebrate Fauna of the Orkney Islands* (Edinburgh, 1891); Craven, *History of the Church in Orkney, 1662–88* (Kirkwall, 1893); id., *The Church in Orkney, 1688–1882* (ib., 1893).

ORLAN′DO. A city and the county seat of Orange Co., Fla., 146 miles south of Jacksonville, on the Atlantic Coast and the Seaboard Air Lines (Map: Florida, E 3). It is a popular winter resort, situated in a healthful region, noted also for its hunting and fishing. The city's most important industry is its extensive fruit-growing interests. Orlando has adopted the commission form of government. Pop., 1900, 2481; 1910, 3894. The city's population in 1915 more than doubled that of 1910.

ORLANDO. 1. The Italian form of Roland, one of Charlemagne's paladins. 2. In Shakespeare's *As You Like It*, a son of Sir Rowland de Bois, brother to Oliver, and Rosalind's lover.

ORLANDO FURIO′SO. A famous poem of Ariosto, first published in 1516. See Ariosto, Lodovico.

ORLANDO INNAMORATO, ēn′nā-mō-rä′tō. See Boiardo.

ORLAN′DUS LAS′SUS. See Lasso, Orlando di.

ORLE (OF. *orle*, *ourle*, Fr. *orle*, from ML. *orlus*, *orla*, dim. of Lat. *ora*, border, coast). In heraldry (q.v.), one of the ordinaries. It is composed of one or two lines passing round the shield.

ORLÉANAIS, ôr′lā′ȧ′nā′. Formerly a province of central France, on both sides of the Loire. It is now included mainly within the departments of Loiret, Loir-et-Cher, and Eure-et-Loir, while smaller portions belong to the departments of Seine-et-Oise, Sarthe, Indre, Cher, Nièvre, and Yonne.

ORLÉANS, ôr′lā′äN′. The former capital of Orléanais, France, and now the capital of the Department of Loiret, situated on the right bank of the Loire, spanned here by a magnificent bridge, 77 miles south-southwest of Paris by rail (Map: France, N., G 5). Orléans is a well-constructed city, with spacious, regular streets and pleasant squares. The city lies in a compact form, extends along the river lined with quays, and is bordered by a semicircle of connected and broad boulevards of the most modern type, occupying the site of the ancient fortifications. There is much curious old timber architecture in the city. The noteworthy late Gothic cathedral of Ste. Croix dates from 1601; it was finished in 1829. It is 472 feet long and has an impressive façade and a central spire 328 feet high.

The hôtel de ville is of brick and stone, dating from 1530. It was reconstructed and enlarged in the last century. In the old hôtel de ville are the municipal museums of painting and sculpture and a museum of natural history. In the ancient and artistic Hôtel de Cabut, formerly called in error the house of Diane de Poitiers, is the valuable Historical Museum of Orléans. The house of Agnes Sorel and the house where the Maid of Orléans lodged are still standing. The latter contains the highly interesting Musée Jeanne d'Arc. This collection includes tapestries, statues, portraits, banners, etc., all connected with or illustrating the history of the heroine. Other interesting buildings are the prefecture, the Palace of Justice (1821), and the Hôtel Dieu, which is considered one of the finest hospitals in France. Orléans has an equestrian statue of Jeanne d'Arc, also a bronze statue of the Republic, erected in 1850. Orléans is on the site of Genabum, the Gallic town burned in 52 B.C. by Cæsar to avenge the murder of Roman traders. It was rebuilt by the Emperor Aurelian and named Aurelianum, whence its modern name. It was an important place under the Merovingians and continued to flourish under the kings of France; in 1309 it became the seat of a university. During the Hundred Years' War it was distinguished for its loyalty. Beleaguered by the English in 1429, the city was relieved by the famous Maid of Orléans, Joan of Arc. It was a Huguenot stronghold during the religious wars, and while besieging it the Catholic leader, Francis, Duke of Guise, was assassinated in 1563. In the Franco-German War of 1870–71 several sanguinary battles were fought in the neighborhood; in October, 1870, it was occupied by the Germans, who were driven out a month later by the French; in December, however, the city was recaptured by the Germans and held until the end of the war. Pop. (commune), 1901, 67,311; 1911, 72,096.

ORLEANS, ôr'lė-*anz*. An island in the St. Lawrence River, belonging to Montgomery County, Quebec, Canada, a few miles below the city of Quebec (Map: Quebec, G 4). It has an area of 69 square miles, with a population of about 5000. The surface is undulating and covered in some portions with extensive forests. The soil is rich and in a high state of cultivation, fruit culture being of considerable importance. The island was General Wolfe's camping ground prior to the siege of Quebec in 1759. Jacques Cartier, in 1535, named it l'Isle de Bacchus, owing to the abundance of its grape vines.

ORLÉANS, ôr'lā'äN'. The name of a cadet branch of the Valois and Bourbon houses of France. Philip, the fifth son of Philip VI of France, was created Duke of Orléans in 1344. After his death, without issue, the duchy was bestowed (1392) on Louis, Count of Valois (1372–1407), the younger brother of Charles VI, who thus became the founder of the house of Orléans-Valois. Louis played an important rôle during the tragic period of the Hundred Years' War, when the fortunes of France under its mad King, Charles VI, were at their lowest. He strove with Philip the Bold of Burgundy for the control of the King, and with his wife, Valentina Visconti, was suspected of plotting for the throne. After the death of Philip Louis was for some time without a rival in the Kingdom, but rendered himself unpopular by his extravagance and the licentiousness of his character. The contest against him was renewed by Philip's son, John the Fearless, whose wife Louis had seduced. A reconciliation between the two took place in November, 1407, and three days later Louis was assassinated at the instigation of John. He had eight children by Valentina Visconti and an illegitimate son, Dunois (q.v.), the celebrated bastard of Orléans. Louis's eldest son, Charles, Count of Angoulême and Duke of Orléans (1391–1465), carried on the struggle against the house of Burgundy as head of the party of the Armagnacs. He was taken prisoner by the English at Agincourt and spent 25 years in captivity. He was noted as a poet. (See Charles of Orléans.) His son Louis ascended the French throne as Louis XII (q.v.) and reunited the Duchy of Orléans to the crown. It was subsequently held by the younger sons of Francis I and of Henry II until 1574, when Henry, Duke of Anjou, the last male scion of the house of Valois, ascended the throne of France. Of the bearers of the title belonging to the house of Bourbon the following are the most important:

Gaston Jean Baptiste, Duke of Orléans (1608–60), best known for his talents in conspiracy. He was the third son of Henry IV of France and of Maria de' Medici and was born at Fontainebleau, April 25, 1608, being known after 1611 as Monsieur. In 1626 he was made Duke of Orléans, and married Mary of Bourbon, Duchess of Montpensier, the richest heiress in France. In the same year he was involved in the conspiracy of Chalais against Richelieu (q.v.) and basely abandoned his accomplice to his fate. He never ceased, however, to intrigue against the great Minister, and in 1632 raised Languedoc against the King with the aid of the Maréchal de Montmorency. He deserted the latter at the battle of Castelnaudary (Sept. 30, 1632), and made his peace with the court, while Montmorency suffered torture and death. In 1636 he plotted with the Count of Soissons against the life of Richelieu, but his cowardice led to the discovery of the conspiracy, and Gaston purchased peace at the expense of his accomplices. He was concerned in the conspiracy of Cinq-Mars (q.v.), but upon the arrest of the latter (June 13, 1642) submitted and pleaded for pardon. He became Lieutenant General of the Kingdom after the death of Louis XIII, and served with credit against Spain. During the Fronde (q.v.) he changed from the court to the Parlement and to Condé, and in July, 1652, was named by the Parlement Lieutenant General. With the triumph of Mazarin his political activity came to an end, and he spent the last year of his life in retirement at Blois. By his first wife, who died the year after their marriage, he was the father of the celebrated Grande Mademoiselle, Anne Marie Louise, Duchess of Montpensier (q.v.).

The title of Duke of Orléans was next borne by Philippe, brother of Louis XIV (1640–1701), the founder of the existing house of Orléans, who had two daughters by his first wife, Henrietta Anne of England, and a son and daughter by his second wife, Elizabeth, daughter of the Elector Palatine. The son, Philippe, Duke of Orléans (1674–1723), was Regent of France during the minority of Louis XV. Louis XIV compelled him to marry his daughter, Mademoiselle de Blois, by Madame de Montespan (q.v.). He displayed great personal courage and military talent during the War of the Spanish Succession in Holland, Italy, and Spain; but his presence in Madrid after his victories (1708) was regarded with apprehension both by Philip V and by Louis XIV. At the death of the latter the Duke of Orléans became sole Regent in 1715. He was popular and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the Regent's adoption of the schemes of John Law (q.v.) led to disastrous results. (See Mississippi Scheme.) He formed an alliance with England and Holland in 1717 and expelled the Stuarts from France. In the same year he held the celebrated *lit de justice*, in which he prohibited the Parlement of Paris from meddling with financial or political affairs and declared the legitimized sons of Louis XIV incapable of succeeding to the throne. His old tutor Dubois (q.v.), who still possessed an unhappy influence over his former pupil, became Prime Minister and practically ruler of France, while the Regent, who was really a man of high abilities, neglected all duties and pursued a course of profligacy perhaps unequaled in history. At the instigation of Dubois the Regent sacrificed the Jansenists and compelled the Parlement in 1722 to recognize the bull Unigenitus. (See Jansenism.) After the coronation of Louis XV, Feb. 15, 1723, and the death of Cardinal Dubois in August of the same year, the Duke of Orléans, although disliking public affairs, consented to become Prime Minister, but he held office for only a few months, dying Dec. 2, 1723. He was succeeded by his son Louis (1703–52), who was followed by his son, Louis Philippe (1725–85).

Louis Philippe Joseph, fifth Duke of Orléans, known as Egalité, born at Saint-Cloud, April 13, 1747. He was first known as the Duke of Montpensier, and after 1752 as the Duke of Chartres. He became Duke of Orléans after his father's death in 1785. In 1769 he married a rich wife and used the money so acquired to strengthen his popularity with the masses. In 1771 he opposed the Chancellor Maupeou and was exiled from court for a number of years. He returned in 1774, but failed to find favor with Louis XVI and the Queen. He commanded the rear of the royal fleet at the naval combat near Ushant in 1778 and made himself popular by advocating the cause of America. His increasing popularity rendered him more and more obnoxious to the court. In the Assembly of Notables in 1787 he declared against the ministerial proposals; and when the King sought to overcome the resistance of the Parlement by a *lit de justice*, he protested against the proceeding. On the assembling of the States-General he took the popular side and voted with the extremists in the National Assembly. When the insurrectionary movements began in Paris in 1789 he promoted them by secret agents and money. The court sent him on an ostensibly diplomatic mission to England, from which he returned, after more than six months' absence, in July, 1790, and engaged in new intrigues hostile to the King. He joined Danton's party, renounced his titles, assumed the name of Philippe Egalité, and was returned to the Convention, in which he took his place with the party of the Mountain. He voted for the death of the King, but failed to win the confidence of the Jacobins. On April 6, 1793, the Convention decreed the arrest of all the members of the Bourbon family, and the estates of the Orléans family were confiscated. Philippe Egalité, with his family, was thrown into prison at Marseilles, and in May was accused of high treason. He was acquitted, but in September was brought before the Revolutionary Tribunal in Paris, and on November 6, 1793, he was condemned, and by his own request was executed the same day. His son, the seventh Duke of Orléans, became King of France in 1830. See Louis Philippe.

Louis Philippe's eldest son, **Ferdinand**, Duke of Orléans, was born in Palermo, Sept. 3, 1810. In 1831–32 he served in Belgium and in 1835–40 in Algeria, and he subsequently took a prominent part in the reorganization of the French army. While on his way from Paris to Neuilly, July 13, 1842, the horses of his carriage became unruly, and in jumping he fractured his skull. For Louis Philippe's other sons see Nemours, Joinville, Aumale, and Montpensier. Ferdinand left two sons, Louis Philippe, Count de Paris (q.v.), and Robert Philippe, Duke de Chartres (q.v.). After the fall of the Empire the Orléans princes were permitted to return to France, whence they had been expelled in 1848, and for a time they exercised considerable influence on the politics of the day. They plotted the restoration of the July monarchy, but enjoyed little popularity owing to their close alliance with all the elements of reaction in France. In 1852 the government confiscated a large part of the Orléans estate, to the value of 50,000,000 francs. In June, 1886, the Count de Paris, the Duke de Chartres, and the Duke d'Aumale were sent into exile, where the two former continued to plot with Boulanger (q.v.) for the overthrow of the Republic.

The son of the Count de Paris, **(Louis) Philippe (Robert)**, Duke of Orléans (1869–), Legitimist pretender to the crown of France, was born at York House, Twickenham, England, Feb. 6, 1869. He was educated in France, at Eu and at the Collège Stanislas, Paris, but when his father became head of the French Bourbons both were exiled (1886). After study at the British Military College at Sandhurst the Duke saw service in the Indian army for two years (1888–89). In 1890, having come of age, he went to Paris and offered himself, as a French citizen, for military service. Arrested under the exile law of 1886, he was tried and sentenced to two years' imprisonment, but after a few months was released and escorted to the Swiss frontier. He then acquired a residence in Brussels. Between 1890 and 1895 he traveled in Asia. In 1896 he married the Archduchess Maria Dorothea of Austria, but separated from her. They had no children, the next heir as head of the French branch of the family being Ferdinand, Duke de Montpensier, a captain in the Spanish navy. Philippe had early assumed the ducal title last used by his grandfather. He made a bid for popularity in connection with the Dreyfus (q.v.) affair in 1897 by upholding the army, but gained little by his interference. In England he had been well received until 1900, when a letter was published showing his approval of certain Parisian caricatures of Queen Victoria. The disfavor that ensued was withdrawn gradually, and he continued to live in the country. During the early months of the European War of 1914 Philippe offered his services to France and then successively to England, Russia, Italy, and Belgium. France was prevented by law from accepting, and the governments of the other countries declined, fearing to offend France. In July, 1915, he was knocked down by a London omnibus and severely injured. Especially interested in Arctic discoveries, the Duke led a notable expedition in the *Belgica* (1905 et seq.) to explore the sea off the northeast coast of Greenland (see Polar Research) and another (1907) to explore the Kara Sea. He published *Une croisière au Spitzberg* (1905); *A travers la banquise* (1907); *La revanche de la banquise* (1909); *Chasses et chasseurs arctiques* (3d ed., 1911). He also collected (1908) the letters of several of the Bourbons. See the bibliography below.

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ORLÉANS, Anne Marie Louise d', Duchess of Montpensier. See Montpensier, A. M. L. d'Orléans, Duchess of.

ORLÉANS, Antoine Marie Philippe Louis d', Duke of Montpensier. See Montpensier, A. M. P. L. d'Orléans, Duke of.

ORLÉANS, Charles, Duke of. See Charles of Orléans.

ORLÉANS, François Ferdinand d', Prince de Joinville. See Joinville, F. F. d'Orléans, Prince de.

ORLÉANS, Hélène Louise Elisabeth, Duchess of (1814–58). She was born at Ludwigslust, daughter of the Grand Duke Frederick Louis of Mecklenburg-Schwerin. In 1837 she married the son of Louis Philippe, Prince Ferdinand of Orléans, who died in 1842. After the fall of Louis Philippe (1848) she attempted to seat her elder son, the Count of Paris, upon the throne, but was unsuccessful and had to leave France for England.

ORLÉANS, Henri Eugène Philippe Louis d', Duc d'Aumale. See Aumale, H. E. P. L. d'Orléans, Duc d'.

ORLÉANS, Henri Philippe Marie, Prince d' (1867–1901). A French explorer, born at Ham, near Richmond, England, oldest son of Robert, Duke de Chartres (q.v.). In 1889–90 he accompanied Gabriel Bonvalot on a journey through Central Asia, two years later he explored Indo-China, and in 1895 discovered the sources of the Irrawaddy, an achievement for which he received the gold medal of the Société de Géographie de Paris and the cross of the Legion of Honor. In 1897 and in 1898 he visited Abyssinia and in 1901 went to Annam, where he died. Among his writings are: *Six mois aux Indes* (1889); *Une excursion en Indo-Chine* (1892); *Autour du Tonkin* (1894); *A Madagascar* (1895); *Du Tonkin aux Indes* (1897); *Une visite à l'empereur Ménélick* (1898).

ORLÉANS, Louis Charles Philippe Raphael d', Duc de Nemours. See Nemours, L. C. P. R. d'Orléans, Duc de.

ORLÉANS, Louis Philippe d', Count of Paris. See Paris, L. P. d'Orléans, Count of.

ORLÉANS, Louis Philippe Marie Ferdinand Gaston d', Comte d'Eu. See Eu, Prince L. P. M. F. G. d'Orléans, Comte d'.

ORLÉANS, Maid of. See Joan of Arc.

ORLÉANS, Robert Philippe Louis Eugène Ferdinand d', Duke of Chartres. See Chartres, R. P. L. E. F. d'Orléans, Duke of.

ORLEANS INDIANS. See Karok Stock.

ORLEY, ôr′lĭ, Bernaert (Bernard) van (c.1492–1542). A Flemish painter of the Renaissance. He was born at Brussels, whence he is also called Barend van Brussel, and was probably a pupil of his father, Valentyn van Orley (1466–c.1530). According to the traditional account he went to Rome in 1509 and there studied with Raphael; but Friedländer has shown that more probably he acquired his knowledge of Raphael's art from the latter's designs for the Vatican tapestries, which were then at Brussels, as well as from engravings of Raphael's works. Orley was also influenced by Jan Gossaert, and later by Dürer. In 1515 he was established in Brussels; in 1518 he was named court painter to Margaret of Austria, Regent of the Netherlands, of whom he painted eight portraits, one of which survives in the Carvalho collection, Paris. In 1520 he entertained Albrecht Dürer (q.v.), who painted his friend's portrait (now at Dresden) the following year. After the death of Margaret he was made court painter to her successor, Mary of Hungary.

Orley's first work is in the style of the early Netherlanders save that the color is cooler. But from about 1521 his style is thoroughly Italianized, even mannered. After 1525 he devoted himself chiefly to designing stained glasses and tapestries. Among the best of his paintings are the altars of the "Death of the Virgin" (1521, Hospital of St. John, Brussels), "The Trials of Job" (Brussels Museum), the "Last Judgment" (Antwerp Museum), and the Hanneten triptych (Brussels). Of his Madonnas there is an excellent early example in the Altman collection (Metropolitan Museum, New York), and there are others in the Ambrosiana (Milan), the Prado (Madrid), the Northbrook collection, London, besides several Holy Families, the best of which is in the Louvre. Good examples of his portraits are owned by the museums of Brussels, Munich, Florence, and Budapest. Consult his biography by Wauters (Paris, 1894) and Firenes-Gevaert, *Le primitifs Flamands*, vol. iii (Brussels, 1910). The most scholarly treatise is by Max Friedländer, in *Jahrbuch der königlich preussischen Kunstsammlung*, vols. xxix, xxx (Berlin, 1908–09).

OR′LOFF. See Plate of Diamonds.

OR′LOP (formerly also *overlope*, from Dutch *overloop*, orlop, a running over, from *over*, over + *loopen*, to run). The deck next below the berth deck in old-fashioned men-of-war. See Deck.

OR′LOV. The name of a prominent Russian family dating (with Vladimir Lukianovitch) from 1613. Grigori Ivanovitch (1734–83) was a grandson of Ivan, the actual founder of the family. He won the love and favor of Catharine II, whom he helped put on the throne. His influence with the Empress, who bore him a son (the first Count Bobrinski), came to an end in 1772. His brother Alexei (1737–1808) also took part in the conspiracy of 1762, and with his own hands strangled Peter III, husband of Catharine II. For his victory over the Turks at Tchesme in 1770 he received the epithet Tchesmensky. He did much for the improvement of Russian horses. Alexei's nephew, named Alexei Fedorovitch (1787–1861), was a natural son of Fedor (1741–96). He fought bravely in the wars with Napoleon and in the Turkish campaign, was plenipotentiary at the signature of the Treaty of Adrianople (1829), and, after acting as Minister to Great Britain, negotiated the Peace of Unkiar-Skelessi in 1833. For a long time he was chief of the Russian police. In 1856 he was made Prince when he was sent to Paris to represent Russia. His son Nikolai (1827–85) was Minister at Brussels (1860–70) and Ambassador at Paris until 1882 and at Berlin. He wrote on the War of 1806 and urged the abolition of corporal punishment.

ORMAZD, ôr′măzd, or **ORMUZD**, ôr′mŭzd (Pers., from Phl. *Aūharmazd*, OPers. *Auramazda*, Av. *Ahura Mazda*, lord wisdom). In the Zoroastrian religion, the Supreme Being. In the Avesta (q.v.) he is represented as the head of the heavenly host and as sovereign over the realm of good, light, and truth. In the Old Persian inscriptions, as well as in the Pahlavi texts and the Avesta, he is the creator of all that is good in the world. Ormazd is the guardian of mankind; he is a giver of rewards; but he may mete out punishment as well. His throne is in the heavens, in the realm of eternal light, where his presence is manifested by splendor and glory. This is the sense in which we must understand the Avesta when it alludes to Ahura Mazda's form. Auramazda is represented on the sculptured rocks of Behistun (q.v.) as a crowned and bearded figure in a winged circle above the head of King Darius, a conception borrowed from Assyro-Babylonian art. In the Sassanian bas-reliefs Ormazd is portrayed on horseback presenting the Imperial crown to Ardashir.

The spiritual side of Ahura Mazda is constantly dwelt upon in the Avesta. He creates through his Holy Spirit, which is a spirit of intelligence as contrasted with the ignorance and lack of prescience on the part of Ahriman (q.v.). In the philosophic development of Zoroastrianism this spiritual essence of Ahura Mazda is often conceived to be an emanation separate and apart from the divinity, acting in opposition to the Evil Spirit, Angra Mainyu, and yet of the same substance as Ormazd. From this transcendental Zoroastrian view it is possible to understand how the different Iranian sects early began to tend towards monotheism as opposed to the earlier dualism which made Ahriman self-existent and coeval, though not coeternal, with Ormazd. This unifying tendency sometimes postulated Boundless Time, or Eternity, as the source alike of Ormazd and Ahriman; sometimes it is presupposed that the Holy Spirit and the Evil Spirit were the children of Ormazd, the wicked principle being due to a moment of doubt on the part of the great god. But in all cases Ormazd rises supreme as the acknowledged head and sovereign of the heavenly kingdom. Ahura Mazda is attended by a band of six (or seven) archangels, Immortal Holy Ones, and also by a score or more of angels and a host of minor spirits.

In viewing the Zoroastrian conception of Ormazd we must also allow the existence of a few reminiscences of naturalistic ideas, a tinge here and there of the sky god warring against the serpent demon of the heavens. But these survivals are very slight. The same is true of the aspects of Varuna in the Vedas, as an old Aryan conception of God. Ormazd as a deity stands far above both Hindu and Babylonian ideals and approaches the Judæo-Christian conception of Jehovah.

Consult: Darmesteter, *Ormazd et Ahriman* (Paris, 1887); Stave, *Ueber den Einfluss des Parsismus auf des Judenthum* (Haarlem, 1898); A. V. W. Jackson, "Ormazd, or the Persian Idea of God," in *The Monist*, vol. ix (Chicago, 1899); id., "Iranische Religion," in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1901–03); M. N. Dhalla, *Zoroastrian Theology from the Earliest Times to the Present Day* (New York, 1914). See Ahriman.

ORMAZD. The name of several kings of Persia. See Sassanidæ.

ORME, ôrm, Philibert de l'. See De l'Orme.

ORME, Robert (1728–1801). An Anglo-Indian historian. The son of Dr. Alexander Orme, physician and surgeon of the British army in Bombay, he was born at Anjengo, Travancore, India, Dec. 25, 1728. He was educated at Harrow, England, and went back to India in 1743 as a writer in the employ of the East India Company. In 1752 he went to England in company with Captain Clive, afterward Lord Clive, Baron of Plassey, his friend for many years. He returned again to India and in 1754 became fourth member of the council at Fort St. George and rose to be a commissary and accountant general (1757–58). He was influential in establishing the power of Great Britain in India and active in the interest of his friend Clive, whom he succeeded in having appointed as military commander of that country. He returned to England finally in 1759 and became historiographer to the East India Company, retiring to Ealing in 1792, where he died (Jan. 13, 1801). His works are historically accurate and are written in a graphic style, but they enter too much into details to be popular. They include *A History of the Military Transactions of the British Nation in Indostan* (2 vols., 1778; 7th ed., 1861), and *Historical Fragments of the Mogul Empire* (1782), in the second edition (1805) of which appeared a biographical memoir of the author and two of his essays.

OR′MER. See Abalone.

OR′MEROD, Eleanor A. (1828–1901). An English naturalist and entomologist. She was born at Sedbury Park, Gloucestershire, and early devoted herself to the study of injurious insects. She was the first woman to receive a fellowship in the Meteorological Society (1878). The Royal Horticultural Society awarded her the silver floral medal for her services to the science of economic entomology, and in 1900 she received the first LL.D. ever given a woman by Edinburgh University. She published: *Cobham Journals* (1880); *Manual of Injurious Insects* (1881; 2d ed., 1890); *Guide to Insect Life* (1884); *Injurious Fruit and Farm Insects of South Africa* (1889); *A Textbook of Agricultural Entomology*

(1892); *Annual Reports of Observations on Injurious Farm Insects* (1877 et seq.).

ORMOC, ôr-mōk′. A town of Leyte, Philippines, situated on the Bay of Ormoc, on the west coast of the island, 34 miles southwest of Tacloban (Map: Philippine Islands, E 5). It is surrounded by stone breastworks and three ruined forts and is an important hemp port. Pop., 1903 (with Albuera), 20,761.

OR′MOLU (Fr. *or moulu,* ground gold, from *or,* from Lat. *aurum,* gold, and *moulu,* p.p. of *moudre,* from Lat. *molere,* to grind). A gilded bronze or fine brass, sometimes colored or lacquered to give it additional brilliancy. It was used, especially during the Gothic and Renaissance periods, for mounting on furniture. It is also used for candelabra and other fine metal work.

ORMONDE, ôr′mond, JAMES BUTLER, twelfth EARL and first DUKE OF (1610–88). A British soldier and statesman, the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. He was born at Clerkenwell, London, Oct. 19, 1610. On his father's death he became Viscount Thurles and heir to the title. His grandfather, Walter, Earl of Ormonde, having displeased James I and having been imprisoned, the young heir was seized as a royal ward and placed under the guardianship of the Archbishop of Canterbury. In his twentieth year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded to the earldom and estates of Ormonde. On Strafford's recommendation Ormonde was appointed to the chief command of the army in Ireland in 1640, just before the outbreak of the great rebellion there. He repeatedly defeated the insurgents. When, in 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the Royalist party in England. During the long contest of Charles with the Parliament Ormonde continued to uphold the royal interest in his Irish government. When the last crisis of the King's fortunes came he resigned his Irish command and retired to France, from which country he again returned to Ireland with the all but desperate design of restoring the royal authority. After a gallant but unequal struggle he was compelled, in 1650, to return once more to France. His services to the royal cause continued unremitting during his exile, and at the Restoration he accompanied Charles II on his return and was awarded for his fidelity by the ducal title of Ormonde and by appointment to several offices. His after life was less eventful, although he twice again returned to the government of Ireland. In 1670 occurred the well-known attempt by the notorious Colonel Blood (q.v.) upon the life of Ormonde. He escaped uninjured and lived until July 21, 1688. His letters and papers were published under the title *Original Letters and Papers Concerning the Affairs of England, 1641–60* (London, 1739). Consult Thomas Carte, *Life of the Duke of Ormonde* (last ed., Oxford, 1851), and Lady Burghclere, *The Life of James, First Duke of Ormonde* (2 vols., London, 1912).

ORMS′BY, JOHN (1829–95). An English author and traveler. He belonged to an English family that settled in Ireland in the reign of Queen Elizabeth and he was born at the family seat, Gortner Abbey, in the County of Mayo. After graduating B.A. from Trinity College, Dublin (1843), he went to London, where he studied law at the Middle Temple, but he soon turned to literature. To *Fraser's Magazine* and other periodicals he contributed many sketches of travel, some of which were collected under the title of *Autumn Rambles in North Africa* (1864) and *Stray Papers* (1876). He was one of the original members of the Alpine Club, founded in 1858. Through his interest in Spain and Spanish literature he has left his most enduring influence. His verse translation of the most poetic portions of the great epic the *Cid* (with prose synopses of the less interesting passages) is admirable (*Poema del Cid,* London, 1879). His complete translation of *Don Quixote* (1885; last ed., 4 vols., Glasgow, 1901, ed. by James Fitzmaurice-Kelly) has superseded all others and is a classic in English. Consult the biographical sketch by Leslie Stephen in the *Alpine Journal* (London, 1896).

OR′MULUM, THE. An English poem written about 1200 by Orm or Ormin (a Danish word meaning worm). Of the author nothing is directly known. He was probably of a Danish family dwelling in the northeastern part of the old Kingdom of Mercia, and he may have been an Augustinian monk. The poem, "named Ormulum for that Orm it wrought," is composed of a series of homilies (based on Bede, Gregory I, and perhaps Josephus and Isidore) extending from the Annunciation into the Acts of the Apostles. It exists in only one manuscript (Bodleian Library), believed to be the author's own copy. The manuscript, containing more than 20,000 half lines, is, however, only a fragment, about one-eighth of the entire work as written by Orm. The poem has great linguistic value as the first noteworthy piece of Anglian, i.e., Northern, English literature after the Norman Conquest. Orm wrote his poem in the regular septenarius, an iambic line, divided into two sections of eight and seven syllables. A marked peculiarity of the orthography is the doubling of consonants for indicating short vowels and for other phonetic reasons. The work was first printed in Oxford in 1852. Consult the *Ormulum,* edited by Holt (Oxford, 1878), and the bibliography of critical works on the poem in Körting's *Grundriss der Geschichte der englischen Litteratur* (Münster, 1899).

ORMUZ, ôr′mŭz, **ORMUS,** or **HORMUZ.** A small island in the entrance to the Persian Gulf (Map: Persia, G 9). It contains the ruins of a city which in the thirteenth century was transferred hither from the mainland. It had long been the headquarters of the Persian trade with India, had a population of 40,000, and remained an important commercial centre after it was captured by the Portuguese in 1515. They retained it until 1622, when it was taken by the English and given to Shah Abbas of Persia, who destroyed the city and transferred its trade to the port of Bender Abbas on the mainland. The island still yields salt and sulphur.

ORMUZD. See ORMAZD.

OR′NAMENT (OF., Fr. *ornement,* from Lat. *ornamentum,* adornment, from *ornare,* to adorn, equip). In general, any adornment executed not for its own sake but for that of the object or structure to which it is applied; in a narrower sense, any motive or element in a decorative scheme or pattern.

Ornament is classified according to various categories. That which belongs to immovable structures is called architectural ornament; the ornament of movable objects and structures (furniture) is called industrial. Ornament whose form is determined by structural features, or which is an inherent part of the structural framework, is called structural ornament; such are capitals and bases, moldings and cornices, finials and corbels. That which is added to a structure or object which has already received definite form is called applied ornament; such are all inlays, mosaic, painted ornament, and plaster work. Ornament produced by relief or depression is called plastic or glyptic ornament, and includes all carved, engraved, chased, and molded ornament; while ornament by color, whether of mosaic, inlay, painting, enamel, or stained glass, is chromatic ornament. When the forms of ornament are purely geometric or fanciful they are said to be conventional, as in Moorish and Saracenic decoration; when copied more or less closely from animal or vegetable forms they are naturalistic; when natural forms are subjected to a decorative regularization they constitute conventionalized natural ornament; such are the acanthus leaves of the Corinthian capital and the foliage of early Gothic carving. Grotesques are decorative combinations of heterogeneous natural forms, as in griffins, sphinxes, Gothic gargoyles, and the like.

Apparently all primitive and savage ornament and most ancient Oriental ornament was originally magical or fetishistic (see FETISHISM), and the artificial symbolism of classic and modern ornament is a survival of this primitive magical significance. Conventional ornament has arisen partly from the gradual decay of originally symbolic forms, partly from the manipulations of pottery, basketry, weaving, and metal work. Structural ornament, which the Greeks were the first to develop into importance, has always derived many of its forms from obsolete structural processes, as the triglyph and dentil from obsolete systems of wooden construction. Structural ornament was carried to the highest perfection by the mediæval church builders, who developed an entirely new system of decorative structural forms in working out the problem of a three-aisled vaulted structure of stone (see GOTHIC ARCHITECTURE); clustered shafts, capitals, vaulting ribs, pinnacles, tracery, etc., were at once structural necessities and decorative embellishments, and all the minor details grew up as the result of this structural development. The Roman system, revived in the Renaissance and almost universally followed today, was to erect a structure of coarse materials and then clothe it in a decorative garment of marble incrustation, stucco, and applied ornament; and the Byzantines and the Mohammedan nations developed the use of applied color, by means of mosaic, stucco, tiles, etc., in different directions to a wonderful pitch of splendor.

Architectural ornament is the most monumental form of the art, but many others display artistic design of a very high order: such are the textile arts, pottery, china, and porcelain; goldsmith's work and enamel; furniture, manuscript illumination, typography, and bookbinding. The Western nations have excelled, as a rule, in form; the Eastern nations in color. Chinese and Japanese art has never been surpassed in its handling of color ornament in porcelains and earthenwares, and it also excels in minute carvings in ivory and castings in bronze. The regions east of the Mediterranean have for ages been famed for their rugs. The laces and brocades of the Renaissance exhibit another development of ornament applied to textiles. The art of manuscript illumination was carried to an extraordinary richness of results in the beauty of its ornament in the fifteenth century in western Europe and also in Moslem lands in that and the following century.

Bibliography. Owen Jones, *Grammar of Ornament* (London, 1865); Auguste Racinet, *L'Ornement polychrome* (Paris, 1885–87); R. N. Wornum, *Analysis of Ornament* (10th ed., London, 1896); James Ward, *Elementary Principles of Ornament* (4th ed., ib., 1899); A. D. F. Hamlin, "The Evolution of Decorative Motives," in the *American Architect* (Boston, 1898–1901); E. C. Haddon, *Evolution in Art* (London, 1902); Richard Glazier, *Manual of Historic Ornament* (New York, 1906); Alexander Speltz, *Styles of Ornament* (ib., 1906); F. S. Meyer, *Handbook of Ornament* (ib., 1904); L. F. Day, *Ornament and its Application* (ib., 1904); id., *Nature and Ornament* (2 vols., ib., 1909).

ORNAMENTS RUBRIC, THE. A rubric in the English Prayer Book on the interpretation of which much of the ritual controversy has turned. It precedes the Order for Morning Prayer and runs as follows: "And here it is to be noted that such ornaments of the Church and of the ministers thereof, at all times of their ministration, shall be retained and be in use as were in this Church of England, by the authority of Parliament, in the second year of the reign of King Edward the Sixth." By "ornaments" are understood, according to an official decision of the Judicial Committee of the Privy Council, "all articles used in divine service." The rubric is simply a more emphatic form of that inserted in 1559 and again in 1604. It was deliberately retained in 1661, in spite of the opposition of the Puritans, and has held its present place since the final revision in 1662. Its interpretation rests upon the question whether it refers to the state of things under the first Prayer Book of Edward or to that immediately anterior to its issue, in the partially reformed services of 1548. The traditional view refers the words of the rubric to the first Prayer Book. But this was not actually in use by authority of Parliament until the third year of Edward's reign. On the other hand, the wording, on the face of it, points to a certain year, the year before the introduction of the Prayer Book. The difficulty of deciding between these views is increased by a clause in the Elizabethan Act of Uniformity. This provided for the retention of the ornaments "until other order be taken by the authority of the Queen's majesty with the advice of the Ecclesiastical Commissioners or of the Metropolitan of this realm," and the question arises whether further order was formally taken or not. There appears to have been little or no effort to enforce the observance of the rubric in Elizabeth's day. The times were troublous, and in some influential quarters there was no intention of using the ornaments. If "other order" was taken it may have been through the Advertisements (see ADVERTISEMENTS OF ELIZABETH) in 1566. But whether these could override the Elizabethan Act or not is a very intricate historical point. Consult Parker, *The Ornaments Rubric* (Oxford, 1881); and see RITUALISM.

ORN'DORFF, WILLIAM RIDGELY (1862–). An American chemist, born in Baltimore. He attended Baltimore City College in 1876–81, graduated from Johns Hopkins (A.B., 1884; Ph.D., 1887), and studied at Greifswald, Berlin, and Heidelberg in 1897–98 and at Munich in 1906–07. At Cornell University Orndorff was instructor in chemistry (1887–90), assistant professor (1890–1902), and thereafter professor of organic and physiological chemistry. In 1890 he served as special agent of the United States Census. Besides contributions to chemical journals he is author of *A Laboratory Manual of Experiments in Organic Chemistry* (1893; 5th ed., 1913) and translator of Dr. E. Salkowski's *Laboratory Manual of Physiological and Pathological Chemistry* (1904).

ORNE, ôrn. A department of France, formed of part of Normandy (Map: France, N., E 4). Area, 2372 square miles, more than one-half of which is cultivated land. A range of wooded hills, attaining a maximum altitude of 1370 feet, extends across the south of the department from east to west. North of this range the surface slopes towards the English Channel. The principal river is the Orne, which gives its name to the department. The climate is damp, though in general temperate. The soil is fertile, but agriculture is not in an advanced state; the chief crops are wheat, oats, and barley. There are many apple and pear orchards in the department and cider is extensively made. The department is famous for its Camembert cheese. Cattle and horses of the purest Norman breed are reared. Marble, granite, and other stones for building are quarried and there are manufactures of textiles and metal wares. Capital, Alençon. Pop., 1901, 326,952; 1911, 307,433.

OR'NITHODEL'PHIA (Neo-Lat., from Gk. ὄρνις, *ornis*, bird + δελφύς, *delphys*, womb). A subclass of the Mammalia, the Prototheria (q.v.), distinguished by the birdlike arrangement of the reproductive organs. Cf. DIDELPHIA; MONODELPHIA.

OR'NITHOLOG'ICAL SOCIETIES. American Ornithologists' Union. A society founded in New York in 1883 and incorporated under the laws of the District of Columbia in 1888, for the advancement of its members in ornithological science and for the publication of a journal of ornithology and other works relating to that science. The union publishes the *Auk*, a quarterly journal of ornithology, the *American Ornithologists' Union Check-List of North American Birds*, and the *Code of Nomenclature*. The *Check-List* is a standard, and many of the principles of nomenclature adopted by the union in 1885 are now used in other branches of zoölogical science. The membership of the union consists of fellows, honorary fellows, corresponding fellows, members, associates, and patrons.

National Association of Audubon Societies for the Protection of Wild Birds and Animals. An endowed membership institution incorporated under the laws of New York. The objects of the association are to arouse to a greater degree the public conscience on the important subject of preserving the wild birds and animals of the country, to secure protection at all times for the valuable nongame birds and for game birds or animals threatened with extermination, and to encourage people to become better acquainted with the wild life about them. The organization is the outgrowth of a movement first started in 1886 by George Bird Grinnell, then editor of *Forest and Stream*. The association is now widely organized throughout the United States, and with an annual income of about $100.000 it has accomplished many notable results. The Audubon Law, which makes it a misdemeanor to trap, snare, or kill nongame birds and provides a definite classification as to what constitutes game birds, has been enacted by the Legislatures of 38 States of the Union. The Audubon Plumage Law, prohibiting the sale of aigrettes and the feathers of other native birds, has been secured in 14 States, embracing such important millinery centres as New York, Boston, Philadelphia, Detroit, Cleveland, New Orleans, St. Louis, Portland, Seattle, and San Francisco. The association has been influential in the efforts made to secure Federal legislation for bird protection. Notable among these are the law providing for the establishment of Federal bird reservations, the Federal Migratory Bird Law, and the law prohibiting the importation of feathers from foreign countries. It has inaugurated and carried to successful issue campaigns in many States for the establishment of State game commissions, laws prohibiting the sale of game and other necessary restrictive measures. Its officers first interested the government in establishing bird reservations, and its agents located and recommended for reservations various breeding colonies of water birds on government territory in various parts of the United States. For a time the association paid the entire salaries of the guards employed to protect these colonies against poachers, and to-day coöperates with the government by maintaining patrol boats on various reservations and sharing the cost of the guardians. In addition the association protects with paid wardens practically all the breeding colonies of water birds found on State lands and on private property situated along the Atlantic coast and about many lakes of the interior. It also hires a force of guards to protect the more important colonies of egrets found in the Southern States. In this dangerous work two of its agents have been shot and the colonies they guarded raided by plume hunters, who were seeking feathers for the millinery trade. This organization has carried on a war against the extensive traffic in native cage birds and has broken up the extensive trapping and shipment of these birds which formerly existed in various States. The association publishes and distributes annually several million copies of colored pictures of wild birds, leaflets on the habits and activities of the species treated, and its magazine, *Bird-Lore*, is the leading bird periodical in the world. Its department of applied ornithology is devoted to giving specific instructions in the subject of the artificial propagation of ducks, geese, pheasants, quail, and other game birds and in the best methods of attracting wild birds about the home by means of nesting boxes, fountains, and feeding stations. In its junior department it annually organizes 150,000 or more children into bird-study classes and supplies them with the best possible material for study at less than one-half the cost of publication. It maintains a force of six field agents and lecturers and is also coöperating financially and otherwise with the summer normal schools for teachers in the matter of giving courses in bird study. The majority of the well-known lecturers on birds are connected in some form with this national association. Its main offices are in New York City. William Dutcher, the president, was stricken by paralysis in 1910. After that time the entire executive work was handled by T. Gilbert Pearson, who was the secretary and financial agent from the beginning of the organization. It is chiefly due to his management that the association developed to such extensive proportions.

OR'NITHOL'OGY (from Gk. *ὄρνις*, *ornis*, bird + *λογία*, *logia*, account, from *λέγειν*, *legein*, to say). The science of bird study. The word was first used, so far as is known, in 1670, in Blount's *Glossographia*, where it is mentioned as the title of a late book. The Hebrew scriptures (Jer. viii. 7 and Song of Solomon ii. 12) show that the Hebrew sages had noted the phenomena of the spring migration, and we are told that Solomon "spake also of beasts, and of fowl, and of creeping things, and of fishes." But hundreds of years before Solomon Egyptian artists were noting birds and drawing and coloring their portraits so well that we may recognize species.

In the writings of Aristotle we find mention of about 170 species of birds, but only about four-fifths can be identified. Pliny the Elder devoted one volume of his writings to birds, much of the information in which was evidently taken from Aristotle, but after him down to the latter part of the seventeenth century there is hardly a work on birds that is anything more than an entertaining compilation of absurdities. The *Historia Animalium* of Gesner, published at Zurich (1551–58), and the *Historia Naturalium* of Aldrovandi, published at Bologna after his death in 1605, are characteristic of the superstitions and utterly unscientific trash which passed for natural history in those days. In 1676 there appeared in Latin Ray and Willughby's *Ornithologia*, and two years later an English revised edition. This book was really a foundation for modern ornithology. It divided birds into the two groups land birds and water birds, and the latter group was again divided into swimmers and those which frequent watery places. For 200 years these divisions were made use of by ornithologists, and it is only within very recent years that they have been discarded. In 1735 appeared the first edition of Linnæus' epoch-making work *Systema Naturæ*, in which chaos was reduced to order and the binomial system of nomenclature was propounded and used. The twelfth edition (1766) is the basis of modern systematic zoölogy. Linnæus followed quite closely the general classification of Ray. Following Linnæus is a long list of ornithologists, one of whom was M. J. Brisson, whose six-volume *Ornithologia* was one of the best works on birds published during the eighteenth century. As a descriptive ornithologist he is ranked among the best. Another Frenchman of note was Buffon, whose nine-volume *Histoire naturelle des oiseaux* is an extraordinary piece of work, especially when considered from a literary point of view. Then there is Latham, whose *General Synopsis of Birds* was completed in 1785, but afterward appeared in several revised editions. The compilation by Gmelin in 1788 of a thirteenth edition of Linnæus' *Systema* was most important, but the rarity of the original has caused some confusion as to what is Linnæus' and what Gmelin's work. The next writer of importance is Cuvier, whose *Règne animal* of 1817 revolutionized zoölogical classification. Cuvier made use almost exclusively of external characters, particularly of the bill and feet. He grouped birds in six orders—Accipitres, Passeres, Scansores, Gallinæ, Grallatores, Natatores. This classification has been the foundation of the classification of birds adopted in natural histories, and even in many zoölogies, down to the present day. The advantages of this classification are clear, for the number of orders is small and they are based on obvious external differences. In addition to this Cuvier's great reputation as a zoölogist gave weight to his views, and consequently the Cuvierian system has continued almost unbroken, the only very radical change being the recognition of the differences between the Carinatæ and Ratitæ and the separation of the latter from the Grallatores.

With the opening of the nineteenth century there came a great increase in the number of bird students and the publication of ornithological literature. American ornithology has been wholly a growth of the past century. In England the publication of Gilbert White's *Natural History of Selborne* in 1789 did more to stimulate popular interest in ornithology than any other book ever has done. It has passed through more editions, by far, than any other work on natural history. Bewick's *History of British Birds* first appeared in two volumes, in 1797 and 1804. The next works of note are the magnificent monographs by John Gould (q.v.)—*Birds of Europe* (5 vols., 1832–37), *Rhamphastidæ* (1834), *Trogonidæ* (1838), *Birds of Australia* (7 vols., 1848), *Trochilidæ* (5 vols., 1849–61), *Odontophorinæ* (1850), *Birds of Asia* (7 vols., 1850–53), and *Birds of New Guinea* (1875–81). We mention all of these because of their wealth of illustration, which consists of more than 3000 colored plates. The works of Illiger, Vieillot, and Temminck appeared between 1810 and 1820, and all three were important leaders in the systematic zoölogy of their day. The works of C. L. Nitzsch deserve special mention because of his being the founder of the study of pterylosis (q.v.) by his *System der Pterylographie*.

Turning now to America, the first ornithologist of any reputation was William Bartram, who published in 1791 his *Travels through North and South Carolina*, which has been called "the starting point of American ornithology." In 1808 appeared the first volume of Alexander Wilson's *American Ornithology*, the last two volumes of which were published in 1814 by Ord, Wilson's friend and editor. Wilson was one of the most remarkable ornithologists, and his great work contains an account of about 280 species of birds, which were not only faithfully described but carefully figured in colors. Several editions of this classic have been published. After Wilson's death his work was continued by Charles Lucien Bonaparte, who published in the years 1825–33 his four large volumes, uniform with Wilson's *Ornithology*. In 1831 appeared the bird volume of Richardson and Swainson's *Fauna Boreali-Americana*, a book of the greatest importance. The *Manual of Ornithology of the United States and Canada*, by Thomas Nuttall, appeared in 1832–34 and is a well-written and interesting treatise. The Audubon period followed, in which appeared that most magnificent of bird books, the original folio edition of Audubon's *Birds of America*. Altogether there were 435 plates with more than 1000 figures. The text to accompany this set of plates consisted of five volumes called *Ornithological Biography* and is intensely interesting reading. These were not by any means the only books which Audubon (q.v.) wrote, but it is on these that his fame rests most securely. There can be no question, however, that much of Audubon's success was due to his keen Scottish friend William MacGillivray, who was an adept at avian anatomy.

The Audubonian period may be said to have passed into the Bairdian in the fifties, especially on the publication in 1858 of volume ix of the Pacific Railroad Reports, devoted to the birds secured by the various parties making surveys for the proposed transcontinental railroad. In this volume Spencer F. Baird came to the front as an ornithologist, for, although he was materially assisted by Cassin and Lawrence, the work was primarily his. It has well been said that this book "effected a revolution in classification and nomenclature," for the names used both for groups and species were a radical departure from those current in the Audubonian period. Baird was the leading American ornithologist of the third quarter of the nineteenth century, and his influence remains strong.

Since 1870 ornithology has progressed marvelously, and among those who advanced it Elliott Coues (q.v.) may be placed foremost because he first made really accessible to American students a knowledge of the bird fauna of their own country. Adding to his very extensive acquaintance with birds a wide knowledge of ornithological literature and history and a charming literary style, he made his *Key to North American Birds* highly influential and, at the period of its first publication (Boston, 1872), an indispensable guide to every bird student. Revised editions were issued successively in 1884, 1887, 1890, and 1903. Dr. Coues was the author of numerous other books and papers, of which *Birds of the Northwest* (1874) and *Birds of the Colorado Valley*, part i (1878), were most important. The critical bibliography begun in the later work and continued elsewhere constitutes a history of the development of American ornithology.

The names of Robert Ridgway and J. A. Allen belong, with that of Coues, in the front rank of American ornithologists of their period. The former spent his life in the service of the Smithsonian Institution and was coauthor with S. F. Baird and T. M. Brewer in the important *History of North American Birds*, of which the first three volumes (land birds) were issued in Boston in 1874 and the last two (water birds) in 1884. Besides many technical and faunal papers he published a *Manual of North American Birds* (Philadelphia, 1887), which embodied the ideas and classification that prevailed at the National Museum. A second edition soon followed. In 1901 appeared the first part (Fringillidæ) of a most comprehensive treatise entitled *The Birds of North and Middle America*, written by Ridgway and published by the Smithsonian Institution as *Bulletin No. 50* of the United States National Museum. This work is purely technical, containing no account of the habits of the birds, but as a guide to American ornithology it is the most advanced and complete treatise of its time. The second part appeared in 1902 and others followed at intervals. The most recent important general résumé of the bird world is Sharpe's five volumes, *A Hand-List of the Genera and Species of Birds* (London, 1899–1909).

Dr. J. A. Allen (q.v.) contributed greatly to the philosophy of ornithology and as editor of the *Auk* for many years exerted a constant and critical scientific influence. The latter part of his life was spent as curator of the department of birds and mammals in the American Museum of Natural History at New York, where his assistant was Frank M. Chapman, whose numerous books, especially his practical *Handbook*, vastly stimulated the growth of recent popular interest in birds. Another important phase of ornithology has recently been developed by C. William Beebe, curator of birds in the New York Zoölogical Park. The collection of living birds of that institution has been brought to a leading position with 900 species and 3000 individuals, and the curator's philosophical study of the living bird in captivity, correlated with its wild habits, opens an entirely new field. Since 1883 the controlling factor in the progress of the science of ornithology in America has been the American Ornithologists' Union.

Cuvier's scheme of classification held its ground in popular books, with little change, during the entire nineteenth century. Since 1860, however, ornithologists have recognized that, however convenient Cuvier's system may be, it is woefully unnatural, and many and varied have been the attempts to produce a natural classification. Of these we can only mention the most important. In 1867 Huxley published his celebrated *Classification of Birds*, based very largely upon skeletal characters, especially those connected with the skull. His classification may be briefly summarized as follows:

- *Division A.* Metacarpals not ankylosed together; tail longer than body; order SAURURÆ.
- *Division B.* Metacarpals ankylosed; tail considerably shorter than body:
    - (*a*) Sternum devoid of a keel; order RATITÆ.
    - (*b*) Sternum provided with a keel; order CARINATÆ.
- Order SAURURÆ. Archæopteryx only.
- Order RATITÆ:
    - (*A*) Humerus short; one ungual phalanx.
        - (*a*) With a hallux: kiwis (Apteryx).
        - (*b*) No hallux: moas, cassowaries.
    - (*B*) Humerus long; two ungual phalanges.
        - (*a*) Ischia united beneath sacrum; pubes free: rheas.
        - (*b*) Ischia free; pubes united ventrally: ostriches.
- Order CARINATÆ.
    - (*A*) Vomer broad behind and interposing between the pterygoids, the palatines, and the basisphenoidal rostrum: *Dromæognathæ* (tinamous).
    - (*B*) Vomer narrow behind; pterygoids and palatines articulating largely with basisphenoidal rostrum.
        - (*a*) Maxillopalatines free.
            - (1) Vomer pointed in front: *Schizognathæ* (plovers, shore birds, gulls, penguins, cranes, hemipodes, fowls, sand grouse, pigeons, hoatzin).
            - (2) Vomer truncated in front: *Ægithognathæ* (passerines, swifts, woodpeckers).
        - (*b*) Maxillopalatines united: *Desmognathæ* (birds of prey, parrots, cuckoos, kingfishers, trogons, ducks, geese, flamingos, storks, cormorants).

This classification was the first important contribution to ornithology after the publication of the *Origin of Species*, and it is really the basis of later systems. The work of Garrod and Forbes on avian anatomy led to many changes in the relative position of certain birds and groups and increased immensely our store of facts, but the systems which they proposed have never met with any general acceptance. Sclater's scheme, proposed in 1880, included some 26 orders, but has failed to meet any wide acceptance. The same criticism applies to his successors, and the complexity of the systems proposed by Reichenow, Stejneger, Fürbringer, and Gadow has militated against their general use. Indeed, it is a rather notable fact that no system that has yet been proposed has proved satisfactory. The chief reason for this is perhaps the homogeneity of the class of birds. This means that, in comparison with other groups, birds should form but a single order, with many smaller subdivisions. Considering them quite by themselves, however, we are justified in establishing numerous orders and thereby relieving the congestion among the subordinate groups. A very full history of the taxonomy of ornithology may be read in the introduction of Newton's *Dictionary of Birds* (New York, 1896). Also consult Sharpe's *A Review of Recent Attempts to Classify Birds* (Budapest, 1891).

The classification of birds, as of other groups of animals, which, with modifications, has been adopted for the purposes of this Encyclopædia (see CLASSIFICATION OF ANIMALS), is that given in Parker and Haswell, *Text-Book of Zoölogy* (New York, 1910), and is in outline as follows:

CLASS AVES

Subclass I. Archæornithes

Extinct, long-tailed, toothed birds. Includes only Archæopteryx (q.v.).

Subclass II. Neornithes

Birds in which the greatly shortened tail usually ends in a pygostyle (see NEORNITHES); metacarpals fused with distal carpals.

Division A. Ratitæ.—Sternum without a keel: flightless birds.

Order 1. Megistanes (emeus, cassowaries, kiwis, and moas).

Order 2. Rheæ (rheas).

Order 3. Struthiones (ostriches).

Order 4. Æpyornithes (*Æpyornis;* extinct).

Order 5. Gastornithes (*Gastornis* and allied Eocene genera).

Division B. Carinatæ.—Sternum with a keel: flying birds.

Order 1. Stereornithes (*Phororhacos* and allied Eocene genera).

Order 2. Odontolcæ (*Hesperornis* and allied Cretaceous genera).

Order 3. Ichthyornithes (*Ichthyornis, Apatornis* and allies of the Eocene).

Order 4. Pygopodes (loons and grebes).

Order 5. Impennes (penguins).

Order 6. Tubinares (petrels, albatrosses, etc.).

Order 7. Steganopodes (cormorants, frigate birds, pelicans, etc.).

Order 8. Herodiones (herons, ibises, etc.).

Order 9. Anseres (ducks, swans, screamers).

Order 10. Accipitres (vultures, falcons, secretary bird).

Order 11. Crypturi (tinamous).

Order 12. Gallinæ (fowls, game birds, curassows, pheasants, and hoatzin).

Order 13. Grallæ (rails, cranes, bustards, etc.).

Order 14. Gaviæ (gulls, terns, and auks).

Order 15. Limicolæ (shore birds, curlews, jacanas, etc.).

Order 16. Pterocletes (sand grouse).

Order 17. Columbæ (pigeons, dodo, etc.).

Order 18. Psittaci (parrots, cockatoos, etc.).

Order 19. Striges (owls).

Order 20. Picariæ (cuckoos, rollers, kingfishers, bee eaters, hoopoes, nightjars, swifts, humming birds, woodpeckers, hornbills, and allies).

Order 21. Passeres (lyre birds and song birds generally).

Worthy of comparison with the above classification is Sharpe's scheme as published in his *Hand-List of Genera and Species.* He accepts 42 orders, 2810 genera, and 18,939 species, although he does not in the latter case differentiate subspecies. His system is as follows:

Subclass **Saururæ.**

Subclass **Palæognathæ.** Order I. RHEIFORMES; II. STRUTHIONIFORMES; III. CASUARIIFORMES; IV. DINORNITHIFORMES; V. ÆPYORNITHIFORMES; VI. APTERYGIFORMES; VII. TINAMIFORMES.

Subclass **Neognathæ.** Order I. GALLIFORMES; II. TURNICIFORMES; III. PTEROCLIDIFORMES; IV. COLUMBIFORMES; V. OPISTHOCOMIFORMES; VI. RALLIFORMES; VII. PODICIPEDIFORMES; VIII. COLYMBIFORMES; IX. HESPERORNITHIFORMES; X. SPHENISCIFORMES; XI. PROCELLARIIFORMES; XII. ALCIFORMES; XIII. LARIFORMES; XIV. CHARADRIIFORMES; XV. GRUIFORMES; XVI. STEREORNITHES; XVII. ARDEIFORMES; XVIII. PALAMEDEIFORMES; XIX. PHŒNICOPTERIFORMES; XX. ANSERIFORMES; XXI. GASTORNITHIFORMES; XXII. ICHTHYORNITHIFORMES; XXIII. PELECANIFORMES; XXIV. CATHARTIFORMES; XXV. ACCIPITRIFORMES; XXVI. STRIGIFORMES; XXVII. PSITTACIFORMES; XXVIII. CORACIIFORMES. Suborder 1. Steatornithes; 2. Podargi; 3. Leptosomati; 4. Coraciæ; 5. Halcyones; 6. Bucerotes; 7. Upupæ; 8. Meropes; 9. Momoti; 10. Todi; 11. Caprimulgi; 12. Cypseli; 13. Trochili; 14. Colii. Order XXIX. TROGONIFORMES; XXX. CUCULIFORMES; XXXI. SCANSORIFORMES; XXXII. PICIFORMES; XXXIII. EURYLÆMIFORMES; XXXIV. MENURIFORMES; XXXV. PASSERIFORMES. Suborder 1. Mesomyodi. Division A. *Tracheophonæ.* Family I. *Pteroptochidæ;* II. *Conopophagidæ;* III. *Formicariidæ;* IV. *Dendrocolaptidæ.* Division B. *Oligomyodæ.* Family I. *Tyrannidæ;* II. *Oxyrhamphidæ;* III. *Pipridæ;* IV. *Cotingidæ;* V. *Phytotomidæ;* VI. *Pittidæ;* VII. *Philepittidæ;* VIII. *Xenicidæ.* Suborder 2. Acromyodi. Division A. *Passeres abnormales.* Family I. *Atrichornithidæ.* Division B. *Passeres normales.* Family I. *Hirundinidæ;* II. *Muscicapidæ;* III. *Campophagidæ;* IV. *Pycnonotidæ;* V. *Timeliidæ;* VI. *Troglodytidæ;* VII. *Cinclidæ;* VIII. *Mimidæ;* IX. *Turdidæ;* X. *Sylviidæ;* XI. *Vireonidæ;* XII. *Ampelidæ;* XIII. *Artamidæ;* XIV. *Vangidæ;* XV. *Prionopidæ;* XVI. *Aerocharidæ;* XVII. *Laniidæ;* XVIII. *Paridæ;* XIX. *Chamæidæ;* XX. *Regulidæ;* XXI. *Sittidæ;* XXII. *Certhiidæ;* XXIII. *Zosteropidæ;* XXIV. *Dicæidæ;* XXV. *Nectariniidæ;* XXVI. *Promeropidæ;* XXVII. *Meliphagidæ;* XXVIII. *Mniotiltidæ;* XXIX. *Drepanididæ;* XXX. *Motacillidæ;* XXXI. *Alaudidæ;* XXXII. *Catamblyrhynchidæ;* XXXIII. *Fringillidæ;* XXXIV. *Coerebidæ;* XXXV. *Procniatidæ;* XXXVI. *Tanagridæ;* XXXVII. *Ploceidæ;* XXXVIII. *Icteridæ;* XXXIX. *Sturnidæ;* XL. *Eulabetidæ;* XLI. *Paramythiidæ;* XLII. *Buphagidæ;* XLIII. *Oriolidæ;* XLIV. *Dicruridæ;* XLV. *Paradiseidæ;* XLVI. *Ptilonorhynchidæ;* XLVII. *Corvidæ;* XLVIII. *Streperidæ.*

See BIRD, and the bibliography there given.

OR′NITHOMAN′CY. See DIVINATION.

OR′NITHOPH′ILOUS PLANTS (from Gk. *ὄρνις, ornis,* bird + *φίλος, philos,* loving).

Plants pollinated by means of birds, especially humming birds. In Africa and some other parts of the world many species are so pollinated, but in most regions only a small number are ornithophilous. The term is being replaced by "bird-pollinated." See POLLINATION.

ORNITHOP′ODA. See DINOSAURIA.

ORNITHORHYNCHUS, ôr′nĭ-thô-rĭṉ′kŭs, **ORNITHORHYNCHIDÆ,** ôr′nĭ-thô-rĭṉ′kĭ-dē. See DUCKBILL.

OR′NITHOSAU′RIA (Neo-Lat. nom. pl., from Gk. ὄρνις, *ornis*, bird + σαῦρος, *sauros*, lizard), or PTEROSAURIA. An order of extinct flying lizards in which the bones are hollow, the fore limbs admirably developed as wings, and the head more or less birdlike in form. They appeared in Jurassic time and continued to the end of the Cretaceous. Among the members of the group are the greatest flying creatures known to have ever lived. The genera are *Dimorphodon*, *Ornithostoma*, *Pteranodon*, and *Rhamphorhynchus*. The principal types of this order are described in the article on PTERODACTYL. See DIMORPHODON.

OR′NITHOS′TOMA (Neo-Lat., from Gk. ὄρνις, *ornis*, bird + στόμα, *stoma*, mouth). The greatest known flying creature that has ever lived, a winged reptile, found in the Cretaceous rocks of Kansas.

OR′OBUS (Neo-Lat., from Gk. ὄροβος, *orobos*, Lat. *ervum*, OHG. *araweiz*, *arwiz*, Ger. *Erbse*, vetch). A name formerly applied to a genus of plants of the family Leguminosæ, allied to vetches and sometimes called bitter vetch, but now merged with *Lathyrus* (q.v.). The species are perennial, chiefly natives of Europe. They afford good food for cattle.

OROCHONES, ŏ′rô-chō′nâz. A people of the eastern Amur in Asia, of the Tungus type. The term Orochon is said to be applied by the Manchus to the Tunguses in general.

OR′ODUS (Neo-Lat., from Gk. ὄρος, *oros*, mountain + ὀδούς, *odous*, tooth). Fossil shark teeth of Carboniferous age.

OR′OHIP′PUS (Neo-Lat., from Gk. ὄρος, *oros*, mountain + ἵππος, *hippos*, horse). An ancestor of the horse in the Middle Eocene period. See HORSE, FOSSIL.

OROIDE, ŏ′rô-īd *or* -ĭd, or **OREIDE,** ŏ′rê-īd or -ĭd (from Fr. *or*, from Lat. *aurum*, gold + Gk. εἶσος, *eidos*, form). A variety of brass which was originally invented in France as a substitute for ormolu and resembling gold. The substances used in making it are: copper, 100 parts; tin or zinc, 17 parts; magnesia, 6 parts; ammonium chloride, 3.6 parts; lime, 1.8 parts; and crude argol, 9 parts. Oroide has a fine grain, is malleable, and takes a brilliant polish; in case of tarnishing the lustre is restored by weak acid. It finds extensive use as a substitute for gold in the manufacture of cheap jewelry. An alloy of copper and aluminium, known as cupror, is superior to the above and is used in the manufacture of tableware, etc.

OROMA, ô-rō′mȧ. An African people. See GALLAS.

O′RONO. A town in Penobscot Co., Me., 8 miles northeast of Bangor, on the Penobscot River and on the Maine Central Railroad (Map: Maine, D 4). It is the seat of the University of Maine (q.v.) and has manufactures of lumber, pulp, and paper, oars, paddles, etc. Settled in 1774, Orono was incorporated first in 1806. The government is administered by town meetings. Pop., 1900, 3257; 1910, 3555.

ORONSAY, ŏ′ron-sā. See COLONSAY.

ORONTES, ô-rŏn′tēz (Lat., from Gk. 'Ορόντης). The ancient name of a river in Syria, now frequently called Nahr el Asi. It rises in the Lebanon Mountains and flows northward as far as the city of Antioch and then westward to the Mediterranean Sea. Its length is about 250 miles. Its lower course is remarkably beautiful, with high rocky banks crowned with luxuriant foliage. Near its source stands an ancient monument. Its valley has for ages formed the highway of traffic and armies to and from Egypt.

ORONTIUS FINEUS, ô-rŏn′shĭ-ŭs fĭ-nē′ŭs (1494–1555). A French mathematician (named Oronce Fine, or Finé), born at Briançon. He was called the "restorer of mathematical science" in France. A chair of mathematics was created for him in 1532 at the Collège de France. Here he wrote his most famous work, entitled *Protomathesis* (1532).

OROOMIAH, ŏ′rōō-mē′ȧ. A town and lake in Persia. See URUMIAH.

O′ROONO′KO, OR THE ROYAL SLAVE, THE HISTORY OF. A novel by Mrs. Afra Behn (q.v.), about 1660.

OROPESA, ŏ′rô-pā′sȧ. See COCHABAMBA.

ORO′PUS (Lat., from Gk. 'Ωρωπός, *Orōpos*). A town in northwestern Attica, on the border of Bœotia, celebrated for its temple and oracle of Amphiaraus. Its situation led to constant strife between the Thebans and the Athenians for its possession. The former held it 412–383 and 366–338 B.C. Subsequently the town seems to have been for a long time independent or to have been reckoned in the Bœotian confederation. It had been restored to the Athenians before the second century A.D., for the traveler Pausanias includes it in Attica. The town lay on the seacoast, on the Euripus, in a little plain, but the temple of Amphiaraus was about 4 miles inland, in one of the beautiful wooded valleys which abound in this region, on a terrace above a little stream. The valley was excavated by the Greek Archæological Society in 1884–87. It contained a temple and an altar, a colonnade, and a small theatre, and we hear also of baths for men and women, and other buildings for the sick, who came to consult the god, but of these no certain remains have been found. Many inscriptions show the popularity of the place and throw light on ceremonies at the temple and oracle of Amphiaraus. It was a resort of the sick, for Amphiaraus was a god of healing and, like Æsculapius, prescribed for his worshipers through dreams. He was also a seer and might be consulted on other affairs. The inquirer, after paying a fee and offering sacrifice, slept in the temple, and his dreams contained the answer to his question. The fame of the shrine was such that Sulla granted the dwellers in the territory of the god exemption from taxation, and his action was later (73 B.C.) confirmed by the Senate after a hearing by the consuls. Consult: Preller, "Ueber Oropos und das Amphiareion," in *Berichte der sächsischen Gesellschaft der Wissenschaften* (Leipzig, 1852); J. G. Frazer, *Pausanias*, vol. ii (London, 1898; new ed., 1913); Dürrbach, *De Oropo et Amphiarai Sacro* (Paris, 1890). The excavations are described and the inscriptions published in the *Praktika* of the Greek Archæological Society for 1884, 1887, 1890, and the *Ephēmeris Archaiologikē* (Athens, 1884–92).

OROSHAZA, ŏ′rŏsh-hä-zŏ. A market town of Hungary, in the County of Békés, 33 miles northeast of Szegedin (Map: Austria-Hungary, G 3). The chief occupations are cattle raising and viticulture. It has a good trade in grain. Pop., 1900, 21,385; 1910, 22,264, mostly Magyars.

ORO'SIUS, Paulus. A Spanish cleric and historian. He was born at Tarragona, or at Bracara, now Braga, Portugal, in the latter part of the fourth century. He went to Africa in 415 to get the advice of Augustine at Hippo as to the suppression of heresy in Spain, and thence to Palestine to consult Jerome at Bethlehem. Here he labored to counteract the influence of Pelagius. He went back to Africa in 416, and is heard from in 417, but the date and place of his death are unknown. His chief work, the *Adversus Paganos Historiarum Libri VII*, was intended to refute the current notion that the misfortunes of the Roman Empire and the wretchedness of the masses were due to the anger of the gods at the abandonment of their worship and the profanation of their altars. The work is inaccurate and uncritical, yet it was a favorite textbook of universal history during the Middle Ages, and was translated into Anglo-Saxon by Alfred the Great (Eng. trans. by Bosworth, London, 1858; ed. by Sweet, ib., 1883). Other works are attributed to Orosius, but not with certainty. Consult T. de Mörner, *De Orosii Vita* (Berlin, 1844).

OROTAVA, ō'rō-tä'vȧ, **La.** A town near the north coast of Teneriffe, one of the Canary Islands (Map: Spain, F 4). It is situated in a remarkably fertile and healthful region. It has a beautiful church and a botanical garden. It exports considerable quantities of wine and cochineal. Pop., 1900, 9002; 1910, 11,242.

OROTHERAPY, ŏr'ō-thĕr'ȧ-pĭ (from Gk. *ὀρός, oros*, whey + *θεραπεία, therapeia*, medical treatment). Serum therapy. See Organotherapy.

O'ROURKE, ō-rōrk', **Edmund.** See Falconer, Edmund.

O'ROVILLE. A city and the county seat of Butte Co., Cal., 75 miles north of Sacramento, on the Southern Pacific, the Western Pacific, and the Northern Electric railroads (Map: California, D 3). Noteworthy features are the Carnegie library, Feather River Cañon, and Fall River Falls. Oroville is situated in a fruit-growing region, has cattle and horse-raising interests, and there are large olive-pickling and fruit-packing plants and an olive-oil factory. It contains roundhouses and repair shops. Pop., 1910, 3859.

OROZCO, ō-rōs'kō, **Pascual** (c.1881–1915). A Mexican revolutionist, born in Chihuahua. His parents were poor and he worked as a driver of a pack train for Francisco Madero (q.v.). When Madero started his revolt against the Díaz régime Orozco came into prominence as an able and daring guerrilla leader (1911). He aided materially in the success of the revolution and was rewarded with the rank of general. However, he received no post in Mexico City and was treated by the new President in a manner which he considered disgraceful. Accordingly in February, 1912, he headed a revolt in northern Mexico against Madero. Successful at first, Orozco marched on Torreon, but was defeated there by General Huerta. He was active again in December and in 1913 adhered to the cause of Huerta, but deserted to the Constitutionalists the following year. Later he went into exile in the United States, where in 1915 he participated in the Científico plots. He then returned to Mexico to take further part in the revolutionary movements. On a border raid into Texas, Orozco was killed by United States soldiers and Texas ranchers.

OROZCO Y BERRA, ō-rōs'kō ē bĕr'rȧ, **Manuel** (1816–81). A Mexican historian and archæologist, born in the city of Mexico. He studied engineering and law, in 1852 became director of archives, and later was professor in the Military School and judge of the Supreme Court (1863). He was director of the National Museum and Councilor of State under the Empire of Maximilian, and because of this was imprisoned for a time by Juárez. Journalism was his first step in literature, and in 1846 he had become editor of *El Porvenir*. He also edited and contributed to numerous other periodicals. He was a collaborator on Andrade's *Diccionario universal de historia y geografía mexicana* and wrote: *Noticia de la conjuración del Marqués del Valle* (1853); *Geografía de las lenguas y carta etnográfica de México* (1864); *Historia antigua y de la conquista de México* (2 vols., 1880).

ORPHAN, The. A play by Thomas Otway (1680).

ORPHANS' COURT. See Surrogate.

ORPHEUS, ôr'fūs; *commonly* ôr'fē-ūs (Lat., from Gk. Ὀρφεύς, of uncertain origin; possibly connected with the Gk. root *ὀρφ-, orph-*, dark, seen in *ὄρφνη, orphnē*, darkness). A Greek legendary musician, whose prominence is largely due to his connection with a body of religious teaching. According to the common literary tradition he was a Thracian, son of Œagros and Calliope or Polyhymnia, though some late writers name Apollo as his father. To him was attributed by some the invention of the lyre or the cithara, while others held that these were given him by Apollo. Proverbial was the power of his music, which drew to him wild beasts, birds, and even fishes, calmed the winds and storms, stilled the raging of the sea, and turned back the course of rivers. His song also plays an important part in the stories connected with the voyage of the Argonauts (q.v.), where he appears as priest and seer. Most famous, however, was his journey to the lower world to recover his wife, Eurydice (q.v.), a legend which seems to have received its full development only in the late Alexandrian time. According to one version Orpheus killed himself in his grief at the second loss of Eurydice; others said he was smitten by the thunderbolt of Zeus because his music by its magic power was breaking down the laws of nature. The most common version was that he was torn in pieces by the Thracian women, in their orgiastic worship of Dionysus, because he had rejected their advances. His members were flung into the sea, whence they were collected by Calliope and the Muses for burial amid the lamentations of all nature and the now remorseful women. Only the head floated across the sea to Lesbos, where it gave oracular responses from the cleft in which it lodged. The wonderful lyre was placed among the stars by Zeus, or inherited by Musæus, or dedicated in a temple of Apollo. Orpheus himself in the other world delighted the shades with his song.

There seem to be no representations of Orpheus in ancient art before the red-figured Attic vases of the earlier fifth century, where he appears simply as a singer among the Thracians, or as murdered by the women. From that time, however, the representations become more frequent, though they are most numerous in the later Hellenistic and Roman periods. Among the scenes represented two are especial favorites in the later art: (1) the rescue or loss of Eurydice, as in the beautiful Attic relief, of which the best example is in Naples and others in Rome and Paris, and (2) Orpheus playing on his lyre, surrounded by the wild beasts, of which several examples occur among the Pompeian paintings, while for some reason not yet satisfactorily stated it was a favorite theme in early Christian art.

The importance of Orpheus was largely due to the mass of religious literature which was attributed to him from the sixth century B.C. The origin and exact nature of these writings and the character of the Orphic sects are among the most intricate and perplexing questions in the history of Greek religious thought, nor is there any general agreement among scholars as to the detailed answers. It seems clear that, amid the general unrest which characterized Greek thought during the sixth century, leading to the speculations of the Ionian physicists and other early philosophers, to the practical maxims of the Seven Wise Men, and other manifestations of distrust as to the earlier beliefs, there sprang up teachers who professed to be able to purify the soul from the sins of this life and secure for it happiness in the world to come. Among the doctrines and rites for securing this happiness those taught in poems attributed to Orpheus seem to have enjoyed the widest popularity and to have influenced largely the thought and life of the time, furnishing more than mere suggestions to Pythagoras and Xenophanes. The votaries submitted to purification by various rites, including the sprinkling with blood, and were required to govern their lives by strict rules, which included abstinence from all animal food and beans and forbade the wearing of any garment containing wool. Those who were initiated and followed the precepts of the master might hope to escape the horrors of Tartarus and to enjoy the bliss of the righteous, as described in a Greek poem which narrated fully the journey of Orpheus to the other world and the revelations there received by him. Gold plates containing verses from this poem have been found in graves in lower Italy, obviously buried with believers to guide them in their journey to the world beyond. It is not clear that there was a large and organized Orphic sect. Rather the teachings and especially the rites seem to have been in the hands of wandering priests, many of whom possessed a very doubtful reputation among the thoughtful, who regarded them as impostors greedy only for gain. On the other hand, there can be little doubt that, according to the common practice among the Greeks, the believers in these teachings formed religious societies. There seems no satisfactory evidence that Orpheus was regarded as a god by these people, for their worship centred in Dionysus and their beliefs and practices were based on a system which seems to have been set forth in a *Theogony*, attributed to Orpheus, and of which many fragmentary citations have been preserved. It is in part an effort to combine the Bacchic worship of Dionysus, the omnipresent god, with the Greek conception of the supremacy of Zeus. In the beginning were Chaos, Cronos (Time), and Æther. From Chaos and Æther Cronos produced a silver egg, from which came Phanes, the creator of all things, who is also Dionysus. After he had produced the heaven and the earth and all things thereon, he retired from sight, but after the world of the gods had grown up Zeus swallowed Phanes, and thus this Dionysus became wholly a part of Zeus. The son of Zeus and Persephone was Dionysus Zagreus, who was to succeed his father, but who was enticed away by the hostile Titans, torn in pieces, roasted, and eaten. The heart alone was rescued and brought by Athena to Zeus, who placed it in the third Dionysus, son of Semele. He also consumed the Titans with his thunderbolt and scattered the ashes through the world, which thus became pervaded by Dionysus. The soul is immortal and at death passes to Hades to be punished or rewarded and then after a time to be reborn in animal or man, according as its former life has been evil or good. Through initiation and pure living the soul may safely pass the perils of the lower world and the judgment, and when it has three times been acquitted of all guilt, it is freed from the round of rebirths and passes to the Islands of the Blessed.

Of the large mass of literature which passed under the name of Orpheus only a small collection of late pieces has survived, the so-called *Orphica*, including the *Argonautica*, a short hexameter poem of 1384 verses, on the voyage of the *Argo*, with special reference to the deeds of Orpheus; the *Lithica*, in 768 verses, containing a discourse of Orpheus on the wondrous properties of stones; and 88 hymns to gods and natural powers. The first two works can hardly be earlier than the fourth century A.D., and most of the hymns are also late, though they may well contain earlier elements. The fragments of Orpheus were edited by Ernst Abel (1885); the hymns were translated into English by T. Taylor (1896).

Bibliography. The scientific treatment of the Orphic mysteries was begun by C. A. Lobeck, *Aglaophamus* (Königsberg, 1892), whose work is still of great value. Consult also: Otto Kern, *De Orphei Epimenidis Pherecydis Theogoniis* (Berlin, 1888); Ernst Maass, *Orpheus* (Munich, 1898), to be used with great caution. For the *Orphica*, see Herrmann, *Neue Heidelberger Jahrbücher*, vi (Heidelberg, 1896). Consult further Herrmann, *Orphica* (Leipzig, 1905); Abel, *Orphica* (Berlin, 1885); Dieterich, *De Hymnis Orphicis* (Marburg, 1891); Paul Knapp, *Ueber Orpheusdarstellungen* (Tübingen, 1895); Alfred Heussner, *Die altchristlichen Orpheusdarstellungen* (Leipzig, 1893); the article "Orphica," in William Smith, *A Dictionary of Greek and Roman Antiquities*, vol. ii (3d ed., London, 1891); E. Norden, *P. Vergilius Maro, Æneis*, Buch vi, pp. 16–22 (Leipzig, 1903); Theodor Gomperz, *Greek Thinkers*, English translation by L. Magnus (New York, 1905); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte* (two vols., Munich, 1906); W. C. Wright, *A Short History of Greek Literature* (New York, 1907); J. E. Harrison, *Prolegomena to the Study of Greek Religion* (2d ed., Cambridge, 1908); Christ-Schmid, *Geschichte der griechischen Litteratur* (two vols., 5th ed., Munich, 1909–13); C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

OR'PIMENT. See ARSENIC.

ORR, ôr, HUGH (1717–98). An American inventor. He was born at Lochwinoch, Renfrewshire, Scotland, but at the age of 20 emigrated to the United States and in 1739 settled at Bridgewater, Mass., where he worked as a gun-smith and manufacturer of edged tools. The 500 muskets produced by him for the province are said to have been the first of American make. During the Revolutionary War his foundry cast for the United States government quantities of cannon and cannon balls. Among his numerous inventions was a machine for the cleaning of flax. For several years he sat in the Massachusetts Senate.

ORR, James (1844–1913). A Scottish theologian and Church historian, born and educated in Glasgow. From 1874 to 1891 he was pastor at Hawick and for the 10 years following was professor of Church history in the Theological College of the United Presbyterian church, from which post he went to Glasgow College to a chair of apologetics and theology. He visited America in 1895 and again in 1897. Dr. Orr took a prominent part in promoting union between the Free and Presbyterian churches. His publications include: *The Christian View of God and the World* (1893; 6th ed., 1902); *The Ritschlian Theology and the Evangelical Faith* (1897; 2d ed., 1898); *Neglected Factors in the Study of the Early Progress of Christianity* (1899); *Progress of Dogma* (1902); *David Hume* (1903); *Problems of the Old Testament Considered with Reference to Recent Criticism* (1906); *The Virgin Birth of Christ* (1907); *The Resurrection of Jesus* (1908); *Side-Lights on Christian Doctrine* (1909); *Sin as a Problem of To-Day* (1910); *The History and Literature of the Early Church* (1913).

ORR, James Lawrence (1822–73). An American political leader, born at Craytonville, S. C. He graduated at the University of Virginia in 1841 and was admitted to the bar two years later. The next year he was elected to the State House of Representatives and from 1849 to 1859 represented his district in Congress. During his last term at Washington he was Speaker of the House and used his power to favor the Lecompton constitution (q.v.) of Kansas and other measures of the slave power. Though a strong partisan of State rights he dreaded the consequences to South Carolina which he foresaw would follow the ordinance of secession passed by the Convention of 1860, of which he was a member. After its passage, however, he accepted the appointment as one of the three commissioners sent to Washington to treat for the transfer of Federal property within the State, and after his return organized and commanded Orr's Regiment of South Carolina Rifles. Before they had seen any real service, however, he resigned his commission in 1862 to enter the Confederate Senate, of which he continued to be a member until the end of the war, when he was elected Governor of South Carolina as a Republican. He represented that State at the Philadelphia Constitutional Union Convention in 1866 and was a delegate to the National Republican Convention in 1872. In 1870 he was appointed United States circuit judge, and in 1873 became United States Minister to Russia, where he died.

ORRENTE, ôr-rän'tâ, **Pedro** (c.1560-70–1644). A Spanish historical, animal, and landscape painter, born at Montealegre, Province of Murcia. He was the friend and perhaps the pupil of El Greco at Toledo, but is called the Spanish Bassano because he painted chiefly Scriptural subjects, in which animals and landscape could suitably be introduced. He worked at Toledo, Murcia, and Valencia, where he established a prosperous school, then at Cuenca, Madrid, and Seville, and is one of the earliest naturalists of the Spanish school. His management of landscape and treatment of light and shade are excellent, but his work is monotonous. Among his finest paintings are "Departure of the Israelites," Academia, Madrid; the "Miracle of St. Ildefonso," Toledo Cathedral; "John the Baptist," in Vienna; and the "Adoration of the Shepherds," Prado, Madrid, which contains seven other works by him.

OR'RERY. An astronomical instrument, showing the motions of the planets round the sun and of the satellites round their planets, which was in high repute during the eighteenth and beginning of the nineteenth centuries, though now regarded as a mere toy. The orrery was probably invented by Graham, but was named after Charles Boyle, Earl of Orrery in Ireland. See Planetarium.

ORRERY, Earls of. See Boyle.

OR'RIS ROOT (probably a corruption of *Iris* root). The rootstock (rhizome) of certain European species of *Iris* (q.v.), viz., *Iris florentina*, *Iris pallida*, and *Iris germanica*, the first of which yields the principal supply. Orris root was formerly used in many medical preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. In drying it acquires a pleasant smell of violets, on which account it is used in perfumery.

ORR'VILLE. A village in Wayne Co., Ohio, 15 miles south of Akron, on the Pittsburgh, Fort Wayne, and Chicago, the Cleveland, Akron, and Cincinnati, and the Wheeling and Lake Erie railroads (Map: Ohio, G 4). There are manufactories of drilling machinery and mattresses and a wood-preserving plant. Orrville is also an important horse market. The water works and electric-light plant are owned by the village. Pop., 1900, 1901; 1910, 3101.

ORSAY, ôr'sâ', **Alfred Guillaume Gabriel, Count d'.** See D'Orsay.

ORSEILLE, ôr'sâ'y'. See Archil.

OR'SHA. A district town in the Government of Mohilev, Russia, situated on both banks of the Dnieper, about 45 miles north of Mohilev (Map: Russia, D 4). It has a large grain trade and is a railroad centre of some importance. Pop., 1897, 13,161; 1911, 20,931.

ORSHANSKY, ôr-shăn'skê, **Ilia Grigorievitch** (1846–75). A Russian-Jewish jurist and publicist, born at Ekaterinoslav and educated at Kharkov and Odessa. Declining a professorship because it involved embracing Christianity, he devoted himself to the study of Russian jurisprudence and the Jewish question, making valuable contributions to both. His principal works are: *The Jews in Russia* (1877); *A History of Russian Legislation on the Jews* (1877); and *Studies in Russian Jurisprudence* (1879). Orshansky investigated the Jewish question with a definite aim and abundant historical data, and applied to the study of Russian civil law principles deduced from the laws of Western countries. In both he was a pioneer.

ORSI, ôr'sê, **Achille d'** (1845–). An Italian sculptor, born at Naples. He studied at the Royal Institute there and later in Rome. At the international art exhibition of 1877 in Naples his life-size group, "The Parasites" (Capodimonte Museum), attracted universal attention by its clever yet exaggeratedly brutal characterization and detailed realistic treatment. Of the same Zolaistic type is his "Proximus

Tuus," representing an exhausted peasant, in the National Gallery, Rome; but the statuette of a "Boy Carrying Water Jars" and the "Head of a Sailor," in the same gallery, are quite different in conception and of the highest merit. He also modeled the statue of Alphonso of Aragon in front of the Royal Palace, Naples.

ORSINI, ôr-sē'nē. A noble family of Rome, celebrated as the champions of the Guelphic cause against their hereditary enemy, the Colonna (q.v.). They first appear prominently towards the end of the twelfth century, when a member of the house was elected to the papal throne as Celestine III. Their strife with the Colonna frequently plunged the city into turmoil, and their rule, like that of their rivals, pressed heavily on the inhabitants. The line of the Orsini divided into the seven branches of Pitigliano, San Savino, Tagliacozzo, Angiullara, Oppido, Bracciano, and Mentana. The only surviving branch is that founded in Naples by Francesco, first Duke of Gravina. The members of the family who attained especial distinction were: Giovanni Gaetano Orsini, who became Pope as Nicholas III (1277), and Pietro Francesco degli Orsini, who ascended the papal chair as Benedict XIII.—Paolo Orsini was a famous condottiere of the first half of the fifteenth century.—Virginio Orsini (died 1497) fought for the papacy under Sixtus IV and against it under Alexander VI. He made common cause with Charles VIII of France in 1494 and was punished by imprisonment at Naples.—Lorenzo Orsini, often called Renzo da Ceri (died 1536), was a general in the service of Francis I of France and fought against the Emperor Charles V. He conducted the defense of Rome against the Imperialist troops in 1527, and after the storming of the city held out for some time in the castle of Sant' Angelo.—Paolo Giordano Orsini, Duke of Bracciano, was the husband of the unfortunate Vittoria Accoramboni (q.v.).—Anne Marie de la Trémouille (1635-1722), widow of Adrien Blaise de Talleyrand, Prince of Chalais, married, in 1675, Flavio Orsini, Duke of Bracciano, and became an ardent and skillful supporter of the French policy at the papal court. In 1701 she went with Philip V to Spain in the official capacity of mistress of the Queen's household, but in reality as the young King's adviser. She sought to establish the Bourbon throne in Spain on a firm basis by creating a national party in support of the new King, and exercised almost absolute power at the Spanish court till the death of Philip's Queen. After the marriage of Philip V to Elizabeth Farnese she retired from Madrid and lived in Holland, Genoa, and Rome. Consult Litta, *Famiglie celebri italiane*, vol. viii (Milan, 1819 et seq.), and Combes, *La princesse des Ursins* (Paris, 1858).

ORSINI, Felice (1819-58). An Italian revolutionist, born in Meldola and known for his attempt on the life of Napoleon III. While a youth he engaged in conspiracies for the liberation of Italy, and in 1844 was condemned to the galleys for life. He was released in 1846 by Pope Pius IX and took an active part in the revolution of 1848-49, fighting at Rome and Venice. Forced to flee the country, he found refuge in England, where he supported himself by lecturing and published *The Austrian Dungeons in Italy* (1857). In 1857 he went to Paris with the intention of assassinating Napoleon III, whom Orsini regarded as the greatest obstacle to the liberation of Italy. On the evening of Jan. 14, 1858, as the carriage containing the Emperor and the Empress was drawing up before the opera house, Orsini and three companions exploded a number of bombs, killing 10 of the bystanders and wounding 150. The Emperor and Empress escaped unhurt. The conspirators were seized, tried and sentenced, Orsini, Pieri, and Rudio to death, and Gomez to imprisonment for life. Rudio's life was spared at the intercession of the Empress, but Orsini and Pieri were executed. Consult *Memoirs of Felice Orsini, Written by himself* (Edinburgh, 1857), and Montazir, *Felice Orsini* (Turin, 1862).

ORSK, ôrsk. A district of east Russia in the Government of Orenburg, situated on the Ural River, 140 miles east of Orenburg (Map: Russia, J 4). It has brickkilns and tanneries and is a trade centre of some importance. Pop., 1897, 14,036; 1910, 21,610.

OR'SON. See Valentine and Orson.

ORSOVA, ôr'shô-vŏ. A frontier town in the County of Krassó-Szörény, Hungary, situated on both sides of the Cerna at its confluence with the Danube, on the Rumanian and Servian boundaries, 94 miles east of Belgrade (Map: Austria-Hungary, H 4). Old Orsova, on the west bank of the Cerna, has a new harbor, with quarantine station, and is a free port, a first-class port of entry, and one of the principal stations for the steamers on the Danube. Pop., 1900, 4610. New Orsova, on the east bank, is inhabited chiefly by Turks, its population being about 3000, and was formerly a Turkish fortress, but has been held by Austria since 1878.

ÖRSTED, ẽr'stĕd, Anders Sandöe (1778-1860). A Danish jurist and statesman, brother of Hans Christian Orsted, born in Rudkjöbing. He was educated at the University of Copenhagen and rose to eminence in the practice of law and as author of legal books and editor of professional periodicals; he also wrote several treatises on the philosophy of Kant and Hegel. He became a judge of the highest court of Denmark in 1810. In 1825 he drew up the ordinances of the Danish law and in 1831 helped draft the provisional constitutions granted by Frederick VI to the Estates. In 1853 he became Premier and acted successively as Minister of Public Worship, of the Interior, and of Public Instruction and Justice. He now showed himself a decided Conservative. At the close of 1854 the King dismissed the Orsted cabinet. In 1855 Orsted and his colleagues in the cabinet were impeached by the Diet; the trial lasted for a year and resulted in acquittal. His main work is *Eunomia* (4 vols., 1815-22). An autobiography of Orsted, *Af mit Livs og min Tids Historie* (4 vols., 1851-57), contains valuable material for Danish historians. Among his other works is a manual of Danish and Norwegian law, *Haandbog over den danske og norske Lovkyndighed* (6 vols., 1822-35).

ÖRSTED, Hans Christian (1777-1851). A distinguished Danish physicist, brother of the preceding. He was born at Rudkjöbing, on the Danish island of Langeland, and studied at the University of Copenhagen, where he took the degree of doctor of philosophy in 1799. Soon after becoming assistant to a professor of medicine he gave lectures on chemistry and natural philosophy. In 1806, after having enjoyed a traveling scholarship for several years, in the course of which he visited Holland, Germany, and Paris, he was appointed professor of natural philosophy in the University of Copenhagen. In 1812 he again visited Germany and France, after having published a manual under the title of *Videnskaben om Naturen's almindelige Love*, and *Förste Indledning til den almindelige Naturlære* (1811). During his residence in Berlin he wrote his famous essay on the identity of chemical and electrical forces, in which he first developed the ideas on which were based his great discovery of the intimate connection existing between magnetism and electricity and galvanism—a treatise which, during his residence in Paris, he translated into French, in conjunction with Marcel de Serres. Orsted's great discovery, made in 1819, was that a magnetic needle was deflected by a current in a wire passing over or below it. This is the earliest experiment in electric magnetism, and at once paved the way for the work of Ampère (q.v.), who discovered the effect of a current upon another current, and made possible the galvanometer, the electromagnet, and other apparatus soon to be devised. This discovery was announced shortly afterward in a Latin essay entitled *Experimenta circa Effectum Conflictus Electrici in Acum Magneticam*. This memorable experiment obtained for Orsted the Copley medal from the Royal Society of England and the principal mathematical prize of the Institute of Paris. Orsted endeavored to make science popular among all classes; with this object he wrote numerous works, contributed scientific papers to the newspapers and magazines of his own country and Germany, and, in addition to his regular lectures in the university, gave courses of popular scientific lectures. Among the works specially written to promote the diffusion of scientific knowledge, those best known are *Aanden i Naturen* (1850) and *Naturlærens mechaniske Deel* (1844). The majority of his more important physical and chemical papers are contained in Poggendorff's *Annalen*, while the paper by Orsted and Seeback, "Zur Entdeckung des Elektromagnetism," is reprinted in *Ostwald's Klassiker*, No. 63 (Leipzig, 1895). His *Samlede Skrifter* were published in nine volumes (Copenhagen, 1850–52). Consult Elie de Beaumont, "Memoir of Orsted," translated by C. A. Alexander, in *Smithsonian Institution, Annual Report*, 1868 (Washington, 1869).

ORSUA, Pedro. See Ursua, Pedro.

OR'TALA, Count of. See Torstenson, Lennart.

ORTEGAL, Cape. See Cape Ortegal.

ORTE'LIUS, ORTEL, or **OERTEL**, ẽr'tĕl, Abraham (1527–98). A Flemish geographer, born at Antwerp. He was the author of the famous atlas, *Theatrum Orbis Terrarum* (1570), long authoritative throughout Europe; *Synonymia Geographica* (1578), reëdited with additions under the title *Thesaurus Geographicus* (1596); *Itinerarium per Nonnullas Galliæ Belgicæ Partes* (1584); and other geographical works. Philip II of Spain recognized his merits and appointed him royal geographer in 1573.

ORTH, ôrt, August (1828–1901). A German architect, born at Windhausen, Brunswick, and educated in Brunswick (1850–55) and Berlin, where he frequented the studio of Strack and in 1856 won the Schinkel prize. After a visit to Italy in 1859 he was active principally in Berlin, where, besides such public buildings as the Görlitz railway station and the cattle market, he erected several church edifices, the Zionskirche (1866–73), the Dankeskirche (1884), the Friedenskirche (1891), the Himmelfahrtskirche (1891–93), and the Emmauskirche (1893), in all of which he endeavored to adapt Romanesque forms to modern exigencies.

ORTH, Johann. See John Nepomuk Salvator, Archduke of Austria.

ORTH, Johannes (1847–). A German pathologist. He was born at Wallmerod and studied under Rindfleisch at Bonn and Virchow in Berlin. In 1878 he was elected professor of pathology at Göttingen and in 1902 succeeded Virchow at Berlin. His works are: *Compendium der pathologisch-anatomischen Diagnostik* (1876; 6th ed., 1900); *Cursus der normalen Histologie* (1878; 5th ed., 1888); *Lehrbuch der speziellen pathologischen Anatomie* (1883–93, incomplete); *Medizinischer Unterricht und ärztliche Praxis* (1898); "Angeborene und ererbte Krankheiten," etc., in Senator's *Krankheiten der Ehe* (1904); *Drei Vorträge über Tuberkulose* (1913). In 1903 Orth became editor of *Virchow's Archiv für pathologische Anatomie* (Berlin).

OR'THERIS, Stanley. A character in Kipling's *Soldiers Three* and other tales of English army life in India.

OR'THIS (Neo-Lat., from Gk. *ὀρθός*, *orthos*, straight, correct). An important extinct genus of hinged brachiopods very common in the Paleozoic formations of all parts of the world. The shells are usually rounded in outline, the valves generally convex, though the dorsal valve is flat in some genera, the cardinal area is well developed, and the hinge is a ball-and-socket mechanism. The several hundred known fossil species have been distributed among a number of new genera and subgenera, of which the more important are *Dalmanella testudinaria* of the Trenton limestone, *Bilobites biloba* of the Niagara beds of North America and the Gotlandian beds of Europe, *Platystrophia biforata* of the Ordovician of America and Europe, *Rhipidomella vanuxemi* of the Hamilton group, and *Schizophoria striatula* of the Devonian. The period of greatest development of the orthids was during the Middle Paleozoic, and they died out towards the end of the Carboniferous period. See Plate of Brachiopoda.

ORTHOCERAS, ôr-thŏs'ē-răs (Neo-Lat., from Gk. *ὀρθός*, *orthos*, straight, correct + *κέρας*, *keras*, horn). A genus of fossil nautiloid cephalopods, characterized by straight conic shells whose surface may be either smooth or transversely striated. The interior of the shells is divided into chambers by simple transverse septa, and there is a median siphuncle. The members of this genus, which range from the Silurian to the Triassic periods, are of much importance as index fossils. The limits of the genus as defined by the majority of writers have been so broad as to include almost all of the straight-shelled Paleozoic cephalopods, and the assemblage of species thus brought together was found by Hyatt and other investigators to contain species that belong more properly in a number of different families and several new genera. All of the straight-shelled forms are now classed together in an artificial group as orthoceracones, in distinction from the curved shells or cyrtoceracones. The orthoceracones are in general antecedent to the cyrtoceracones in each family or race. They appear first in the Upper Cambrian and are very abundant in the Ordovician rocks, where *Orthoceras titan* of the

Black River limestone, with a length of about 10 feet, is the largest known form of this group of cephalopods. During the Ordovician the orthoceracones gave rise to several derived genera of curved and coiled shells and to shells with peculiarly restricted apertures. Some of these forms gave rise to side lines of evolution that flourished for variable periods of time, such as *Cyrtoceras*, *Gyroceras*, *Lituites*, *Phragmoceras*, and *Ascoceras*. *Nautilus* itself, which has persisted to the present day, was derived in early Ordovician times from one of these orthoceracones through a curved shell like *Cyrtoceras*. During the Silurian, Devonian, and Carboniferous periods the orthoceracones diminish in both size and number and they disappear during the Trias. The derivation of Belemnites of the Mesozoic from some Paleozoic orthoceracones is considered by some authors to have taken place through the formation by the orthoceras of a heavy deposit of lime upon the apical portion of its shell, this serving as a post to anchor the shell in an upright position in the mud of the sea bottom. Consult Von Zittel and Eastman, *Text-Book of Paleontology*, vol. i (New York, 1900), and Rudolf Ruedemann, "Professor Jaekel's Theses on the Mode of Existence of Orthoceras and Other Cephalopods," in *American Geologist*, vol. xxxi (Minneapolis, 1903).

OR′THOCLASE (from Gk. *ὀρθός*, *orthos*, straight, correct + *κλᾶσις*, *klasis*, fracture, from *κλᾶν*, *klan*, to break). One of the monoclinic feldspars, composed of potassium aluminium silicate. It has a vitreous lustre and is either colorless or white, though occasionally light yellow or red and sometimes green. It usually occurs in crystalline rocks and is an essential constituent of granite, gneiss, syenite, porphyry, etc. The several varieties of orthoclase include adularia, a transparent or translucent variety that shows when polished chatoyant or pearly reflections, the best varieties of which are cut into gems and are known as moonstones; aventurine, a similar variety with red and yellow internal reflections, due to minute scales of occluded minerals, the green varieties being known as sunstones; perthite, a flesh-red variety containing layers of albite and often yielding bright golden-yellow reflections; and variolite, a dark-green variety, which takes its name from its supposed power to cure smallpox. In 1915 efforts were being made to perfect commercial processes by which the potassium constituents of orthoclase and of microcline (q.v.) might be partly substituted for the potash salts, formerly imported from Germany. See Feldspar; Potassium.

ORTHODONTIA, ôr′thô-dŏn′shĭ-ȧ. See Dentistry.

ORTHOEPY, ôr′thô-ē-pĭ, *or* ôr-thō′ē-pĭ (Gk. *ὀρθοέπεια*, *orthoepeia*, correct speaking, from *ὀρθοεπεῖν*, *orthoepein*, to speak correctly, from *ὀρθός*, *orthos*, straight, correct + *ἔπος*, *epos*, word). That part of grammar which treats of the correct pronunciation of the words of a language.

OR′THOFORM (from Gk. *ὀρθός*, *orthos*, straight + *form* as in *chloroform*, q.v.). Methyl ester of para aminometaoxybenzoic acid, a white crystalline powder, without odor or taste, used as a local anæsthetic in the form of a dusting powder or ointment for painful ulcers, especially those occurring in the air passages. The drug is efficient only when it comes into direct contact with exposed sensory nerves. Internally it has been given to relieve the pain of gastric ulcer and cancer. It is almost insoluble in water and is not absorbed by the unbroken skin or mucous membrane. It is used at the present time chiefly to relieve the pain of tuberculous ulcerations in the larynx, into which it may be blown as a powder or injected in the form of an emulsion.

OR′THOGEN′ESIS (from Gk. *ὀρθός*, *orthos*, straight, correct, + *γένεσις*, genesis, origin). Evolution in a definite direction determined by the environment. It is opposed to evolution through selection of chance variations. See Natural Selection.

ORTHOG′ONAL. See Projection.

ORTHOG′RAPHY (Fr. *orthographie*, Lat. *orthographia*, from Gk. *ὀρθογραφία*, correct writing, from *ὀρθός*, *orthos*, straight, correct + *γράφειν*, *graphein*, to write). The art of writing words correctly as regards spelling. The word is seldom used in an absolute sense, i.e., with the meaning of spelling which is scientifically correct, since outside of the discussions of phonetists (see Phonetics) such spelling does not exist; it ordinarily signifies merely the art of spelling in accordance with accepted or prevailing usage and also such customary spelling itself. (See Spelling; Spelling Reform.) In musical notation it signifies the art of representing tones and effects by the proper characters, while in architecture it is a geometrical representation of an elevation or section of a building.

ORTHOGRAPHY, Figures of. Deviations from the ordinary accepted spelling of words. They are three in number, archaism, crasis, and mimesis. Archaism consists in spelling words according to a usage which is obsolete or obsolescent, as if one should write, "The *gret Kyng hathe* fifty fair *damyselles alle maydenes*." So Vergil has *olli* for *illi*, Horace *duellum* for *bellum*. Crasis (Gk. *κρᾶσις*, a mixing) in Greek grammar denoted the mixing of two words by the coalescence of their final and initial vowels into one long syllable. Thus, *τὰ αὐτά* became *ταὐτά* and *καὶ ἐγώ* became *κἀγώ*. The occurrence of crasis is indicated by the coronis ('), similar in appearance to a smooth breathing, placed over the vowel or diphthong of the resulting long syllable. In Latin grammar the term "crasis" was applied to the union of any two vowels into a long vowel or diphthong, and so became synonymous with "contraction." Examples of crasis in Latin are *cogo* (for *coago*), *nil* (for *nihil*), *cors* (for *cohors*). Mimesis (Gk. *μίμησις*, imitation) consists in the representation of the improper pronunciation of words by means of false spelling. Mimesis is common in works which profess to represent the speech of the illiterate, or which introduce characters who use dialect or negro speech.

OR′THOPE′DICS (from Gk. *ὀρθός*, *orthos*, straight + *παῖς*, *pais*, child). A branch of surgery devoted to the prevention, correction, or alleviation of deformities, especially of the human spine and extremities. It is distinguished from general surgery by the extensive utilization of mechanical appliances. The term "orthopedic" was first introduced by Andry in his treatise published in French in 1741, in English in 1743, and in German in 1744. In the pre-antiseptic era reliance was placed mainly on mechanical fixation apparatus supplemented by subcutaneous surgical procedures. During the past 20 years, however, the art has developed greatly, keeping pace with the advance in general surgery and pathology. Open operations are done freely; many deformities are cured by operative means alone; the X-ray has made the diagnosis of bone and joint lesions more exact and the results of treatment more satisfactory. The transplantation of bone, fascia, muscle, tendon, and nerve, for the restoration of function of disabled or the replacement of destroyed tissue, and the re-forming of joints that have become ankylosed (as a result of some infection, injury, or other pathologic process), are now commonplace achievements. Deformities coming particularly under the observation and care of the orthopedic surgeon may be conveniently divided into several classes, according to their causation.

Tuberculosis. Tuberculous abscesses of bones and joints may occur at any age, but arise most frequently during childhood, covering the period of active bone growth. As a rule the tubercle bacilli reach the blood through the gastrointestinal tract (ingestion infection), but infection also occurs by way of the tonsils, by inhalation, and by inoculation. The bacilli are carried by the blood stream to the bone marrow, where they find lodgment in the terminal vessel loops in the epiphysis of the long bones. No bone, joint, or tissue in the body is immune, but invasion is most often observed in the spine (Pott's disease), hip, ankle, elbow, and shoulder, in the order named. Local treatment includes immobilization of the part by plaster of Paris dressings or well-fitted steel braces, to encourage the process of repair. Where much destruction has occurred in and around a joint the aim is to secure ankylosis, or bony union, of that joint. Sunlight and the Röntgen ray are being used with increasing frequency for the treatment of sinuses. (See HELIOTHERAPY.) Proper hygienic surroundings, sunshine, fresh air, and a nutritious diet are important. Operations on tuberculous bones and joints in children, except in special cases, are inadvisable. In adults, on the other hand, operative measures often afford the most speedy and permanent relief. Striking examples of this are resection of a tuberculous knee joint and bone grafting for spinal caries.

Syphilis. This may be acquired or inherited. The condition known as Charcot or tabetic joint is the lesion that comes oftenest under the notice of the orthopedic surgeon. The joint is usually painless, enlarged, and wabbly (unstable joint) and the patellar reflexes are either abolished or are very sluggish. The enlargement is due to friction and erosion of the joint surfaces and resultant multiple minute fractures of the bone ends. The lesion is a trophic one and develops in about 5 per cent of syphilitic cases and in some other cord diseases. Operative interference is contraindicated. Supporting braces are worn to give stability to the weakened joints.

Disturbances of Metabolism. The results of perverted nutrition as manifested in bone are seen in rickets (q.v.), osteomalacia (q.v.), and osteoarthritis, causing disability and deformities of the extremities that occasionally call for mechanical or operative orthopedic treatment. The rachitic deformities most often demanding surgical measures are bowlegs and knock-knees; they comprise about 15 per cent of all distortions of the lower extremities seen in public clinics. The etiology of bone lesions due to disturbed metabolism is not yet fully understood. The rôle played by the ductless glands (see SECRETIONS, INTERNAL) is undergoing further study along these lines. We know that in rickets an insufficient deposit of lime salts keeps the bones soft, and we also know that in osteomalacia there is a loss of the normal proportion of lime salts contained in the bones, and that this loss produces the softening and resultant deformities; and we know further that feeding a patient with calcium salts has no effect on the bone lesions.

Infections. The most important and fruitful cause of deformity of the extremities seen in children is anterior poliomyelitis, commonly called infantile spinal paralysis (q.v.). Recent scientific research and animal experimentation have established the fact that the process is an infective one, due probably to an ultramicroscopic bacterium; although Flexner and Noguchi have described a visible globoid body which they believe to be the causative organism. The disease attacks the anterior columns of the spinal cord, causing partial or complete paralysis of certain muscle groups and bringing about paralytic distortions, those of the foot embracing the various types of clubfoot—talipes valgus and varus, equino and calcaneo varus and valgus, pes cavus, pes planus, etc. Involving the knee are genu valgum, genu varum, genu recurvatum, and flexion deformities. Paralytic dislocation of the hip and shoulder, scoliosis, and torticollis (wry neck) may also be caused by an attack of anterior poliomyelitis occurring months or years previously. The treatment of these lesions is mechanical or surgical or both combined. Mechanical ingenuity and skill in applying proper supporting apparatus are demanded. Operative measures are extremely varied and are among the most important in orthopedic surgery. Removal of bones wholly or in part (according to the age of the patient), transplantation of bone, tendon, muscle, and fascia, nerve and bone grafting, are all made use of. Minor operations consist of subcutaneous tenotomies for the relief of contractions, or in mild cases forcible stretching under general anæsthesia may be sufficient, followed by mechanical fixation to prevent recurrence. Other infections may reach the extremities and spine by way of the blood stream. The primary causes are tonsillitis, grip, lateral sinus infection, tooth abscess, pneumonia, gonorrhœa, and typhoid fever. Suppurative infections also occur as a result of direct inoculation.

Congenital Deformities and Anomalies. These include dislocation, especially of the hip joint, torticollis, scoliosis, clubfoot, everted foot, fusion of bone, absence of bone, supernumerary digits, webbed toes and fingers.

Lesions of the Nervous System—brain, cord, and peripheral nerves—resulting in deformity of the extremities are numerous and varied and frequently present difficult problems regarding treatment. They may be due to infections, as in the case of anterior poliomyelitis; to poisons, as, e.g., wrist drop in plumbism; or to birth injuries, representing the various hemiplegias, paraplegias, and diplegias. (See PARALYSIS.) The essential symptom is paralysis, flaccid or spastic, or, more rarely, inequalities of development. Hysterical contractures, paralyses, and even deformities occasionally demand orthopedic treatment. These lesions have no demonstrable organic basis, but simulate genuine pathological conditions. The diagnosis is often difficult and can only be cleared up in some instances by examination under general anæsthesia.

Static Conditions. A very common deformity is flatfoot, due to wearing improper shoes, prolonged standing, overweight, carrying heavy loads, and as the result of conditions lowering the general neuromuscular tone. Cure may be brought about by certain exercises which strengthen the ligaments and muscles, by manipulations, temporary adhesive plaster supports, and finally by wearing properly made arch supports. The other common static defects observed, usually in children, are scoliosis and round back. These may be functional or structural. Treatment of the latter is unsatisfactory; but functional curvatures in youth, even if marked, may be corrected by specially prescribed exercises, gymnastics, and the wearing of braces.

Prevention. A great many deformities observed in growing children originate in improper diet and faulty hygiene and are therefore preventable. The vast majority of children are born healthy and symmetrical. In infancy dietary errors soon manifest themselves in marasmus, rickets, scurvy, general muscular weakness, and anæmia, which conditions lay the foundation for subsequent bony defects and distortions. Children are often encouraged to stand or walk too early and thus acquire deformities of the feet, legs, and back. Creeping, which is a valuable physiological training to the child, should be prolonged, not shortened. When the child reaches the school age it is apt to be already the possessor of many defects which crowding, confinement, bad lighting and ventilation, and cramped postures tend to enhance. Medical surveys of large numbers of school children reveal the fact that comparatively few are entirely normal. See SCHOOLS, MEDICAL INSPECTION OF.

Principles of Orthopedic Treatment. Orthopedic surgery has developed, to a high degree of perfection, certain methods which may be divided into (1) mechanical, comprising the use of bandages, straps, splints, and apparatus; (2) operative, embracing manual manipulation and surgical operations; (3) gymnastics, consisting of specially adapted exercises and movements. All of these may have to be utilized in a given case. The roller bandage is used to restrict motion, to afford support and compression, and to keep other apparatus in position. Adhesive plaster strapping is effective in limiting acute joint effusions, in sprains, and flatfoot. It is employed where only relative immobility is indicated and is generally applied in narrow overlapping strips. The plaster of Paris bandage or splint finds wide application in orthopedic practice. It may be fixed or removable. This material is most generally used as a fixed splint, but other materials may serve, such as leather, felt, paper, celluloid, and various metals. Metal splints enable the direction and amount of motion to be controlled, and where traction, combined with correction and fixation, becomes necessary, are indispensable.

Operative treatment is not necessarily surgical. Many deformities, such as congenital clubfoot, may be cured entirely by manipulations begun at once. Even the severest deformities, such as congenital dislocation of the hip, may be overcome by manipulation under anæsthesia. Bowlegs may be manually corrected in children under three or four years of age. Cutting operations have to be done in many cases. Diseased tissues have to be removed, osseous defects supplied by transplantation, and bony overgrowths resected. A procedure that is extensively practiced is tenoplasty. Tendons may be lengthened, shortened, or grafted. Where a contraction is due to shortening of the tendon the latter may simply be cut by the subcutaneous method and the deformity reduced. The tendon of a functionating muscle may be sutured to a paralyzed one or vice versa, or the attachment of a tendon to the periosteum may be shifted to another point. In the paralysis following anterior poliomyelitis much may be accomplished by tenoplasty.

Gymnastic treatment is sometimes effective in stretching and loosening contracted tissues and for the relief of functional deformities of the spine. It is also of value in weak feet. Active and passive movements may be combined with gymnastic exercises and manipulations. (See MECHANOTHERAPY.) Massage is of only moderate value in orthopedics.

For fuller descriptions of the common deformities of the spine and extremities, with their special treatment, see CLUBFOOT; KNOCK-KNEE; HIP JOINT; LEG; POTT'S DISEASE; SPINE, CURVATURE OF.

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ORTHOP'ODA (Neo-Lat. nom. pl., from Gk. *ὀρθός*, *orthos*, straight, correct + *ποῦς*, *pous*, foot). An order of dinosaurs, in the system of Gadow, embracing the groups Stegosauria and Ornithopoda of Marsh. See the sections on these groups under DINOSAURIA.

ORTHOP'TERA (Neo-Lat. nom. pl., from Gk. *ὀρθόπτερος*, having upright wings, from *ὀρθός*, *orthos*, straight, correct + *πτερόν*, *pteron*, wing). A large and important group of insects comprising the forms known as the straight-winged insects and including the grasshoppers or true locusts, long-horned grasshoppers (including katydids), crickets, cockroaches, walking sticks, and leaf-insects, and the praying mantis or rear-horse (qq.v.). The mouth parts are fitted for biting, and the metamorphoses are incomplete, the young when first hatched closely resembling the adult insects except in lacking wings. The eggs are few in number and as a rule are laid in specialized egg cases, although with some they are deposited without such cases and with a few are scattered singly. The fore wings are somewhat thickened, but are not so tough as the wing cases of beetles, and when at rest lie closed upon the back so as to protect the abdomen and the hind wings. They are known as tegmina. The hind wings function in flight and are delicate and usually folded like a fan. About 10,000 species exist, which makes it a small order when compared with the Hymenoptera, the Coleoptera, and the Lepidoptera, but, in spite of the comparatively small number of eggs, many of the species are tenacious of life and apparently very prolific, and swarm in enormous numbers of individuals, as in the case of the destructive and migratory locusts. One of the striking peculiarities of the order is that we find here most highly developed the ability to produce sounds of a more or less musical character by rubbing one part of the body, modified for the purpose, upon another. This capability thus to make sounds is confined to the male sex, and its object is to attract the female; and this ability belongs only to the families which jump (the Saltatoria); the runners, walkers, and graspers (Cursoria, Gressoria, and Raptoria) make no sound, but in these groups the phenomena of protective and aggressive resemblances are very highly developed, especially in the tropical forms. In these groups the wings seem to be of little use as organs of flight, but they are of striking value in ornamentation and in concealment. This is especially true with the Phasmidæ and Mantidæ, where the effectiveness of color and pattern is extraordinary, the tegmina resembling plant structures with remarkable minuteness of detail. Even the eggs are so modified as to resemble the seeds of plants.

Orthoptera are among the oldest of fossil insects. Cockroaches were numerous and varied in Paleozoic time, and the other families are numerously represented in Mesozoic and Tertiary rocks.

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OR'THORHOM'BIC SYSTEM. See Crystallography, and Plate of Crystal Forms.

ORTIGUEIRA, ôr'tē-gä'ē-rȧ. A town in the Province of Coruña, Spain, situated in a beautiful valley at the head of a landlocked bay 23 miles northeast of Ferrol (Map: Spain, A 1). The harbor is well sheltered, but shallow, and has no wharves; the town is chiefly noted for its romantic surroundings and for the good sea bathing afforded. Pop. (commune), 1900, 18,975; 1910, 18,807.

ORT'LER, or Ortler Spitze. The highest peak of the Austrian Empire, on the border of the Tirol, 68 miles southwest of Innsbruck (Map: Switzerland, E 2). It rises to a height of 12,802 feet from the northern portion of the Ortler group, in the chain of the Rhætian Alps. It was first ascended in 1804 and is now considered an easy climb. The view from the snow-clad summit is the most imposing of the eastern Alps.

ORT'MANN, Arnold Edward (1863–). An American paleontologist, born in Magdeburg, Germany. He was educated at Strassburg, Kiel, and Jena, receiving the Ph.D. degree at Jena in 1885. After service in Germany as teacher and museum assistant Ortmann came to the United States in 1894 and was curator of invertebrate paleontology at Princeton University until 1903. Thereafter he held a like position in the Carnegie Museum at Pittsburgh, and after 1910 was also professor of physical geography in the University of Pittsburgh. He was a member of a collecting expedition to East Africa in 1890–91 and of the Princeton Arctic expedition in 1899. His publications include: *Grundzüge der Marinen Tiergeographie* (1896); a continuation of *Die Decapoden* in Bronn's *Klassen und Ordnung des Tierreiches* (1898–1900); *Tertiary Invertebrates of Patagonia* (1902).

OR'TOLAN (Fr. *ortolan*, from It. *ortulano*, ortolan, gardener, from Lat. *hortulanus*, gardener, from *hortus*, garden). A European bunting (*Emberiza hortulana*) having a plumage of mixed browns, black, and white. It appears in the autumn in great flocks on both coasts of the Mediterranean Sea, when it returns from its summer home and breeding places in the Far North. No bird is so highly esteemed by epicures, and vast numbers are used for the table. It is taken chiefly by nets. See Plate of Buntings.

In America the name is given to both the bobolink (reedbird) and the sora rail, neither of which has the slightest relation to an ortolan, but both of which are small birds, much sought in the fall in the Middle States as a delicacy. See Plate of Buntings and Grosbeaks.

ORTOLAN, ôr'tō'län', Joseph Louis Elzéar (1802–73). A French jurist, born at Toulon. He studied law at Aix and Paris and made his reputation by publishing *Explication historique des institutes de Justinien* (1827; 12th ed., 2 vols., 1883) and *Histoire de la législation romaine* (1828; 12th ed., 3 vols., 1884). He was assistant librarian and after 1830 secretary general of the Court of Cassation. In 1836 he became professor of comparative criminal law at the University of Paris. Ortolan is also author of *Histoire du droit constitutionnel en Europe pendant le moyen âge* (1831); *Introduction historique au cours de législation pénale comparée* (1841); *Sur la souveraineté du peuple* (1848); *Eléments du droit pénal* (1854–56); *Règles internationales et diplomatie de la mer* (2 vols., 4th ed., 1864).

OR'TON, Edward (1829–99). An American educator and geologist. He was born in Deposit, N. Y., graduated at Hamilton College in 1848, and studied at Lane Theological Seminary, at the Lawrence Scientific School, Harvard, and at Andover Theological Seminary. He taught successively at the State Normal School, Albany, N. Y., at the Chester (N. Y.) Academy, and at Antioch College, of which he was also president in 1872–73. He was first president of the Ohio Agricultural and Mechanical College (now Ohio State University) (1873–81) and was professor of geology there from 1873 to 1899. He was an assistant State geologist (1869–82), was State geologist (1882–99), served for a time on the geological surveys of the United States, of Kentucky, and of Kansas, and was president of the Geological Society of America (1897) and of the American Association for the Advancement of Science (1899). He was essentially an economic geologist and specialized in the study of oil and gas, developing several well-known theories, notably the anticlinal theory, and becoming widely known as an authority on the nature and geological occurrence of these products. He wrote portions of vols. i, ii, and iii and a large part of vols. v, vi, and vii of the *Reports* of the Ohio Geological Survey, besides numerous papers in the geological magazines and papers on petroleum, gas, and asphalt in the *Kentucky Geological Reports* (1891) and in the *Report* of the United States Geological Survey (1887). The last contribution from his pen was *Petroleum and Natural Gas in New York* (1899).

ORTON, Edward, Jr. (1863–). An American industrial chemist, born at Chester, N. Y. In 1884 he received the degree of E.M. from Ohio State University. He served as chemist and superintendent of blast furnaces in 1884–88, was the first to manufacture a high silicon alloy of iron in the United States, and after 1888 managed the plants of several clay industries until 1893. Orton was largely instrumental in establishing the first school of the clay, glass, and cement industries in America. In 1902–06 and after 1910 he was dean of the college of engineering of Ohio State University and in 1902–06 he served also as State geologist. Besides reports and technical articles he wrote *The Progress of the Ceramic Industry* (1903) and *Qualities of Paving Bricks* (1911).

ORTON, James (1830–77). An American naturalist, born at Seneca Falls, N. Y. He graduated at Williams College in 1855 and then studied at Andover Theological Seminary. In 1860 he returned from an extensive trip through Europe and Palestine and was ordained a Congregational minister. He became professor of natural science at the University of Rochester in 1866. The next year, for the Smithsonian Institution, he took charge of a scientific expedition to the equatorial Andes and the Amazon. This having proved exceptionally fruitful in the number and importance of specimens collected, in 1873 he made a second journey up the Amazon. In 1876 he set out to explore the Great Beni River, but after great hardships died from exposure when returning. He was buried on Esteves Island, Lake Titicaca. From 1869 to the time of his death Orton had been professor of natural history in Vassar College, and in 1915 Vassar graduates undertook to erect a marble shaft over his grave. He published: *The Miner's Guide and Metallurgist's Directory* (1849); *The Andes and the Amazon* (1870); *Underground Treasures: How and where to Find them* (1872); *Comparative Zoölogy* (1874).

ORTONA, ôr-tō′nȧ. A town in the Province of Chieti, Italy, situated on the Adriatic, 12 miles east of Chieti (Map: Italy, E 3). It has a cathedral, a ruined castle, a harbor, and an extensive trade in wine. Pop., 1901, 14,974; 1911, 16,081.

OR′TYGAN (from Neo-Lat. *ortyx*, from Gk. ὄρτυξ, quail). A button quail (q.v.), bush quail, or bustard quail of the Old World genus *Turnix*, which includes a large number of diminutive game birds of pleasing appearance and excellent qualities. These birds are called hemipodes. Their resemblance to quail is a rather superficial one, and their closest affinity seems to be with the rails. They are usually placed in a separate suborder Turnices.

ORTYGIA, ôr-tĭj′ĭ-ȧ. An ancient name of Delos (q.v.).

ÖRTZEN, ẽr′tsen, Georg, Baron (1829–1910). A German poet. He was born at Brunn, Mecklenburg-Strelitz, studied law, served in the Prussian army (1850–55), and then entered the consular service. He was employed in New York (1879), Constantinople (1880), Marseilles (1881), and Christiania (1889), and retired in 1892. He wrote several volumes of verse, including: *Gedichte* (3d ed., 1861); *Aus den Kämpfen des Lebens* (1868); *Satiren und Glossen eines Weltmannes* (1874); *Epigramme und Epiloge in Prosa* (1880); *Eines Lyrikers Chronik* (1888); *Auf Schwarzwaldwegen* (1896); *Nacht* (1900); *Symphonien des Windes* (1901); *Es waz ein Traum* (1902). He published also *Erlebnisse und Studien in der Gegenwart* (1875). At times he wrote under the pseudonym Stephan Ervésy.

ORU′BA. An island of the Dutch West Indies. See Aruba.

ORURO, ō-rōō′rō. A department of west Bolivia (Map: Bolivia, D 7). It is the smallest department of the country, with an estimated area of 20,657 square miles. The surface is an elevated plateau, a part of the great Titicaca basin, and is interspersed with marshes and arid plains. The climate is cold and the soil mostly unfit for agriculture, though some cattle raising is carried on. The mineral deposits are rich, including tin, silver, gold, copper, bismuth, antimony, and kaolin. The commerce of the department is carried on through Antofagasta, Chile. Pop., 1900, 86,081, largely Indians; 1914 (est.), 122,600. Capital, Oruro (q.v.).

ORURO. The capital of the Department of Oruro, Bolivia, situated 9 miles east of the Desaguadero River, 12,122 feet above sea level and 127 miles southeast of La Paz (Map: Bolivia, D 7). It has a large central plaza and its principal buildings are the post office, barracks, and church of San Francisco. The School of Mines is located here. The city has electric lights, a tramway, and numerous industrial establishments, including a large boot factory. Its chief importance is due to the rich tin and silver mines in the immediate vicinity. Pop. (est.), 20,670. Oruro was founded in 1595.

ORVIETO, ôr-vyā′tō. A town and episcopal see of central Italy, in the Province of Perugia, 60 miles north-northwest of Rome (Map: Italy, D 3). Known in the Middle Ages as Urbs Vetus, it occupies the site of an ancient Etruscan city, on a steep hill 1165 feet high, accessible by an inclined railway. It has been the see of a bishop since 509, and was repeatedly a place of refuge for the popes. The cathedral, with a façade which is a beautiful specimen of the Italian Gothic, richly adorned with mosaics, polychromatic marbles, and sculptures, was begun in 1290 by Lorenzo Maitani. The body of the church, with its round piers, round arches, and timber roof, is built with alternate courses of white and black marble and is Tuscan-Romanesque rather than Gothic in style. It possesses numerous paintings and sculptures, including a fine altar by A. Sansovino. There are several other churches, chief among them the Gothic San Giovenale, dating from the eleventh century, and the thirteenth-century San Domenico with the tomb of Cardinal di Braye. Other interesting features are the castle with the public garden and amphitheatre, the episcopal palace, St. Patrick's Well, with a double spiral staircase leading to the water 100 feet below, and the former papal palace, or Palazzo Soliano, with a museum containing mediæval works of art and a collection of antiquities, most of them found in an Etruscan necropolis between the town and the railroad station. It has a lyceum, Gymnasium, a technical school, and a seminary. The city trades in grain, cattle, silk, oil, and white wine. Pop. (commune), 1901, 18,543; 1911, 19,148.

ORYX, ō′rĭks (Lat., from Gk. ὄρυξ, *oryx*, gazelle, pickaxe, from ὀρύσσειν, *oryssein*, to dig). A large antelope of northern Africa (*Oryx leucoryx*), distinguished by its uniform whitish color, often reddish on the under part, and by the sabre-like curve of the great horns, which may touch the rump when the head is thrown back. These horns are able to sweep around with immense force and effect, and hunters find oryxes dangerous animals to approach when wounded. This species, which is confined to the eastern Sudan and Nubia, is known by the

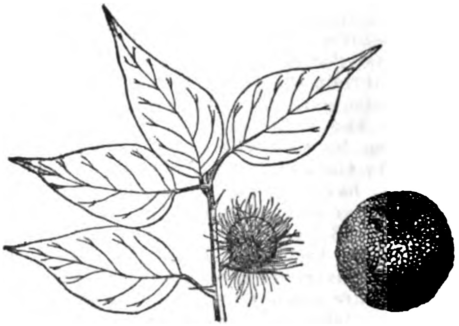
Arabs as abu harte, and represents the genus which includes the gemsbok, addax, beatrix antelope, beisa (qq.v.), and some other species of the desert and plains regions of Africa. The word "oryx" among the ancients was the name of an antelope often represented on the monuments of Egypt, usually in profile, so that it seems to have but one horn. It is evident that one or another species of this genus was portrayed, and the fable of the unicorn may have arisen from these mural paintings. See Plate of ANTELOPES.

ORZESZKOWA, ôr'zhesh-kō'vȧ, ELIZA (1842–1910). A Polish novelist. She was born near Grodno, Lithuania, at 16 married a Polish noble, who was banished to Siberia in 1863 for having taken part in the Polish insurrection, and after that time devoted herself to literature and the advocacy of woman's rights, a cause which she championed in the novels *Pan Graba* (1872), *Waclawa's Diary* (1870), and *Martha* (1872). Other important novels are: *Eli Makower* (1874), which treats of the relations of the Jews to the Polish nobility; *Meir Ezofowicz* (1878), which bears upon the contest between Talmudic orthodoxy and liberal theology in a rural setting; *Lost Souls* (1886) and *Cham* (1888), profoundly sympathetic sketches of life in White Russia; *On the Niemen* (1888) and *Bene Nati* (1892), both descriptive of the lesser nobility. Eliza Orzeszkowa's sympathies and her literary horizon kept continually widening. Her later works include: *Mirtala* (1890) and *The Vestal* (1891), two novels from Roman history; *The Votaries of Power* (1900); *The Argonauts* (1899); *Anastasia; Ad Astra.* She also edited a volume of tales dealing with Jewish life, *From a Single Source* (1905). Much of her work is available in German translation.

OSAGE, ō-sāj', *or* ō'sāj (properly *Ouasage,* the French form of *Washashe,* or *Wasash,* the name used by themselves). An important Indian tribe of Siouan stock (q.v.), formerly holding an extensive area between the Missouri and Arkansas rivers, Oklahoma, and at present gathered upon a reservation in northeastern Oklahoma. They are mentioned by Marquette as early as 1673, and through the Colonial period generally acted as allies of the French against the other tribes. Their principal wars were with the Cherokee and Chickasaw in the east and with the Kiowa, Cheyenne, Pawnee, and others on the plains. By successive cessions, beginning in 1808, they sold their original extensive territory until their removal to their present reservation in 1870, but were able to secure such terms that they became the richest tribe per capita in the United States. Later their lands were found to be in the oil belt, and the royalties on the wells now in operation have further augmented their incomes. The result, however, has been rather detrimental, tending to encourage dissipation and hinder industrial progress. From an estimated population of over 6000 a century ago they have diminished to 3000 in 1875 and 1373 in 1910.

OSAGE. A city and the county seat of Mitchell Co., Iowa, 61 miles by rail northwest of Waterloo, on the Red Cedar River and on the Illinois Central and the Chicago Great Western railroads (Map: Iowa, E 1). It has the Sage Public Library, a fine high school, and Cedar Valley Seminary. Osage is of considerable importance as the shipping point of a productive farming, stock-raising, and dairying region, and there are extensive nursery interests. The city has municipal water works. Pop., 1900, 2734; 1910, 2445; 1915 (State census), 2778.

OSAGE (ō'sāj) **ORANGE,** or BOW WOOD (so called from the Osage Mountains in Arkansas, of which it is a native), *Maclura pomifera,* or *Toxylon pomiferum.* A North American tree of the family Urticaceæ, which attains a height varying, according to soil and situation, from 20 to 60 feet. Its wood, which might probably be used for dyeing as a substitute for fustic (q.v.), is bright yellow, fine-grained, and very elastic, and was much used by the North American Indians for making bows. The tree has been successfully used in many places as a hedge plant, its thorny stems forming an impenetrable barrier when properly trained. Its inedible fruit, which is about the size of a large orange, has a tuberculated surface of a golden color and is filled internally with radiating somewhat woody fibres and with a yellowish milky juice, the odor of which is generally disliked. The leaves of the Osage orange have been very successfully substituted for mulberry leaves in feeding silkworms.



LEAVES AND FRUIT OF OSAGE ORANGE.

OSAGE RIVER. A tributary of the Missouri. It rises in the prairies of eastern Kansas, about 30 miles southwest of Topeka, flows southeastward and enters the Missouri (Map: Missouri, C 3). The river is about 280 miles long, but following all of its many smaller windings its length is probably at least 500 miles. Its drainage basin includes about 15,300 square miles. The river receives all of its water from precipitation. Fine agricultural lands lie along its banks, and in the region are rich mineral deposits. The stream is also called Marais des Cygnes.

OSAKA, ō-sä'kȧ, or **OZAKA,** ō-zä'kȧ (Jap., contraction of *O-ye-zaka,* the great estuary hill, in allusion to the rising ground on which the castle stands). An important manufacturing and trading centre of Japan and one of the three Imperial cities (Map: Japan, D 6). It is situated on the island of Hondo, on both banks of the Yodo River, the outlet of Lake Biwa, and on the shores of Osaka Bay, 20 miles by rail from Kobe. The city is intersected by the Yodo and numerous canals spanned by 1300 bridges, and has in consequence been styled the Venice of the East. The streets are laid out with great regularity at right angles to each other and are in the main narrow. The town has an average annual temperature of about 59° F. and a rather unhealthful climate.

Osaka has many industries, its principal manufactures being those of cotton, glass, and iron and steel products. Other important manufactures are boots and shoes, matches, tobacco products, clocks, etc. There is also considerable shipbuilding. The Osaka Ironworks has a shipyard which covers 16 acres and has a water frontage of 1000 feet. A fine government mint, for which 40 acres are used, was established here under foreign superintendence in 1871. In connection with it are a refinery and sulphuric-acid works, which are a source of great profit to the government. Osaka was opened in 1868 for foreign residence and trade, and a foreign settlement was laid out on the river island of Kawaguchi. The harbor, however, is poor and unsuited for large vessels, and Kobe has attracted most of the foreign trade, especially since the opening of the railway. The foreign settlement is, therefore, occupied for the most part by missionaries. Commercially Osaka is important chiefly in the internal trade, while in regard to foreign commerce it is only of slight importance in comparison with Yokohama and Kobe. In 1913 imports to Osaka amounted to $20,754,413 and exports from Osaka to $36,579,320. Small steamers ply between Osaka and the ports of Shikoku and the Inland Sea.

There are many temples and places of interest in the city and vicinity. The chief is the castle, which is one of the most famous in Japan. It stands on high ground in that part of the city known as the Upper Town. At the end of the fifteenth century its site was occupied by the monastery and temples of the Shin Shu sect of Buddhists, and was so strongly fortified by them that it defied the repeated attacks of the great general Nobunaga. In 1583 Hideyoshi (q.v.) made it the seat of his power and erected within the citadel a palace, which was, as some authorities believe, the most magnificent building the world ever saw. It survived the attack of Iyeyasu (q.v.) against Hideyori, Hideyoshi's son, but was burned by Tokugawa retainers in the civil war of 1868. It now contains the headquarters of the Osaka military district. In 1909 one-third of the city was destroyed by fire, with a loss of 25,000,000 yen. Pop., 1898, 821,235; 1909, 1,226,647.

OSARS. See Eskers.

OSAWATOMIE, ŏs′ȧ-wăt′ō-mĭ. A city in Miami Co., Kans., 61 miles south by west of Kansas City, Mo., on the Missouri Pacific Railroad (Map: Kansas, H 6). It derives its name from two streams near by, the Osage and Pottawatomie. It is the seat of the oldest and largest State insane hospital, with accommodations for about 1200 patients, dating from 1866, and has a Masonic temple, the John Brown Memorial (State) Park, the Agnew Opera House, a city hall, a Carnegie library, and a monument commemorating the battle of Osawatomie. The city is in an agricultural, dairying, and stock-raising region. Division headquarters and shops of the Missouri Pacific Railroad are maintained here. The commission form of government was adopted in 1914. There are municipal water works, electric-light plant, and sewage system. Osawatomie was one of the free-State settlements made by the Emigrant Aid Society in 1855, and was prominent in the contest between the proslavery and antislavery elements in Kansas. For a time John Brown lived in the immediate vicinity of the town. On Aug. 30, 1856, it was the scene of a sharp skirmish between a band of proslavery men and John Brown and his followers and, after the latter had been dispersed, was almost completely destroyed by the former. Osawatomie was chartered in 1883 and in 1890 became a second-class city. Pop., 1900, 4191; 1910, 4046.

OSBORN, ŏz′bŭrn, Henry Fairfield (1857–). An American paleontologist, born at Fairfield, Conn. He graduated at Princeton in 1877 and was assistant professor of natural science there in 1881–83 and professor of comparative anatomy in 1883–90. In the latter year he was made Da Costa professor of zoölogy in Columbia University, where he was dean of the faculty of pure science (1892–95) and became research professor of zoölogy in 1910. From 1891 to 1910 he was curator of vertebrate paleontology in the American Museum of Natural History, and after 1908 was president of the board of trustees of the museum. Osborn's Western explorations resulted in great contributions to American paleontology and in remarkable additions to the collection of the Natural History Museum, where his reconstructions of prehistoric mammals are displayed. To the Canadian Geological Survey he was paleontologist in 1900–04 and to the United States Geological Survey after 1900. At various times he served as president of the American Society of Naturalists, the Morphological Society and the Bison Society. Osborn wrote: *Evolution and Heredity* (1890); *From the Greeks to Darwin* (1894; 2d ed., 1897), an historical sketch of evolution; *Hereditary Mechanism* (1895); *Evolution of Mammalian Molar Teeth* (1907); *The Age of Mammals* (1910; Ger. ed., 1914); *Huxley and Education* (1910); *Men of the Stone Age* (1914).

OSBORN, Sherard (1822–75). An English naval officer, explorer, and author, born in Madras, India. Entering the British navy in 1837, he soon rose to a captaincy and served in Malayan and Chinese waters. In the search for Franklin he commanded the *Intrepid* (1850–51), making a sledge trip of 506 miles, and also the *Pioneer* (1852–54), when he made a remarkable sledge trip of 860 miles in 94 days. During a part of the Crimean War he was senior officer in the Sea of Azov, and he took a spirited part in the war at Canton (1857–58). In 1873 Osborn became rear admiral. His writings include: *Stray Leaves from an Arctic Journal* (1852); *Discovery of the Northwest Passage by Captain R. M'Clure* (1856); *Quedah; or, Stray Leaves from a Journal in Malayan Waters* (1857); *The Career, Last Voyage, and Fate of Sir John Franklin* (1865).

OSBORNE, ŏz′bôrn, Dorothy (1627–95). An English letter writer, daughter of Sir Peter Osborne. It was probably in 1654 that she married Sir William Temple (q.v.), seven years after he had first met and loved her. Rivals and the dislike of Dorothy's parents for Sir William were responsible for the delay. Her letters to her fiancé, those of 1653 and 1654 remaining, prove Dorothy Osborne one of the most engaging and delightful of English letter writers. Macaulay warmly praised the few letters included in the appendix of Courtenay's *Life of Temple*, and ultimately these and others were admirably edited by E. A. Parry as *The Love Letters of Dorothy Osborne* (London, c.1888; new ed., New York, 1901). This volume is the living presentment of a charming Englishwoman of the seventeenth century, in an age often thought of only for its dissolute reckless-ness. The *Letters* are to be had also in the Everyman's Library.

OSBORNE, Francis (1593–1659). An English author. He was the son of Sir John Osborne, of Chicksands, Bedfordshire, lived in London, where he was employed in the office of the Lord Treasurer's remembrancer, and about 1650 removed from North Fambridge to Oxford. There he held minor office under the Commonwealth and lived uneventfully, gaining some fame and many influential friends in London after the publication of his *Advice to a Son* (1656–58). This popular work was published anonymously. It contained a series of pithy commonplaces somewhat in the manner of Lord Chesterfield. Besides several political pamphlets Osborne wrote *Traditional Memoirs of the Reigns of Queen Elizabeth and King James I* (1658) and a *Miscellany of Sundry Essays, Paradoxes, etc.* (1659). His collected works were published in 1673 and in 1722 reached an eleventh edition.

OSBORNE, Oliver Thomas (1862–). An American physician and therapeutist. He was born at New Haven, Conn., graduated M.D. from Yale in 1884, studied in Leipzig in 1885, and settled the following year in his native town. In 1911 he became professor of therapeutics at Yale Medical School. He was president of the American Therapeutic Society in 1905. In 1908 he became editor of the therapeutic section of the *Journal of the American Medical Association*. Of this association's council of pharmacy and chemistry Osborne was a member, as he was also of the committee on the revision of the *United States Pharmacopœia*. Among his writings are: *Diphtheria* (1890); *Therapeutic Uses of Organic Extracts* (1902); "Organotherapy," in *System of Physical Therapeutics* (1905); *Introduction to Materia Medica and Pharmacology* (1906); *Suggestions for the Pharmacopœia of 1910* (1910); *Mixtures of the United States Pharmacopœia* (1913); *The Prevention and Treatment of Infections* (1915). He also edited a *Handbook of Therapy* (1910; 2d ed., 1912).

OSBORNE, Thomas. See Danby, Earl of.

OSBORNE, Thomas Mott (1859–). An American manufacturer and prison reformer, born at Auburn, N. Y. He graduated from Harvard University in 1884 and immediately entered business, eventually becoming president of the Auburn Publishing Company, and vice president of the Columbian Rope Company and the Eagle Wagon Works. He was prominent in civic affairs in Auburn, and while reform mayor (1903–05) made a reputation for executive efficiency. Subsequently he was a member of the Public Service Commission of the second district (1807–09). Osborne became chairman of the National Committee on Prison Reform and traveled widely to study conditions. While chairman of the New York Commission on Prison Reform in 1913 he had himself committed for a week to Auburn State Prison. (Consult his *Behind Prison Walls*, 1914.) Magazine articles and addresses on the subject brought him nation-wide attention, and in 1914, after the Sullivan-McDermott scandal at Sing Sing, he was appointed warden of that prison and allowed to put into practice some of the methods which he had advocated. The appointment, made during the administration of Governor Glynn, was allowed to stand by Governor Whitman. When speaking in public, as he did often and effectively, the warden took occasion to advocate the indeterminate sentence (see Penology) and to urge the necessity of a prison farm to replace Sing Sing. Although a practical business man, Osborne, as was inevitable, was criticized by many as a theorist. However, he found much valuable support in his undertaking, which on the whole proved not only interesting but notably fruitful. In 1915 a serious controversy arose between the warden and State Superintendent of Prisons Riley. Besides numerous articles on prison reform and the trust problem Osborne wrote *The Adventures of a Green Dragon* (1908).

OSBORNE HOUSE. A country residence of Queen Victoria on the Isle of Wight, in the neighborhood of the town of East Cowes. Osborne House was bought by the Queen in 1840. Here she died, Jan. 22, 1901. After her death King Edward presented Osborne House to the English people and it is now known as the Royal Naval College.

OS'BORN-HAN'NAH, Jane (c.1880–). An American operatic soprano, born at Wilmington, Ohio. She studied under Vittorio Carpi at the Chicago Conservatory of Music, under William Shakespeare in London (1898), under Marchesi and Sbriglia in Paris, and the Wagner rôles under Rosa Sucher (q.v.) in Berlin and Bayreuth. In 1907 she was married to an American consul, Frank Sanford Hannah. She first sang in concerts in the United States, made her début in grand opera in 1906 as Elizabeth in *Tannhäuser* at Leipzig, where she sang for three years, then appeared in Berlin and other German cities and at Covent Garden, London. After two seasons at the Metropolitan Opera House, New York (1910–12), she became one of the most important artists of the Chicago-Philadelphia Opera Company.

OSBOURNE, ŏz'bŭrn, Lloyd (1868–). An American writer, son of Samuel Osbourne and of Fanny Van de Grift (afterward the wife of Robert Louis Stevenson). He was born in San Francisco and studied engineering at the University of Edinburgh. With Stevenson he went to Samoa, where in 1897 he was appointed vice consul to represent the United States; and with his stepfather he wrote *The Wrong Box* (1889), *The Wrecker* (1892), and *Ebb Tide* (1894). His own work includes: *The Queen versus Billy, and Other Stories* (1900); *Love the Fiddler* (1903); *The Motor-Maniacs* (1905); *Baby Bullet* (1905); *Three Speeds Forward* (1906); *The Adventurer* (1907); *Schmidt* (1907); *Infatuation* (1909); *The Kingdoms of the World* (1911); *A Person of Some Importance* (1913); and two plays, both in collaboration with Austin Strong, entitled *The Little Father of the Wilderness* and *The Exile*.

OSCA. See Huesca.

OS'CAN. One of the ancient languages of Italy. See Italic Languages; Latin Language.

OS'CAR I (1799–1859). King of Sweden and Norway from 1844 to 1859. He was born in Paris, July 4, 1799, being the son of Marshal Bernadotte. (See Charles XIV John.) After the election of his father as Crown Prince of Sweden Oscar received the title of Duke of Södermanland from Charles XIII. In 1818 he entered the University of Upsala. He was accomplished in the fields of science, literature, and the fine arts, and was an enthusiastic student of music. He was in full sympathy with the Swedish nationalists. He succeeded his father, March 8, 1844. His rule was distinguished for its justice and for many liberal measures, such as the removal of Jewish disabilities, freedom of manufactures and commerce, and parliamentary reform. In 1823 he married Josephine Beauharnais, the granddaughter of the Empress Josephine, by whom he had five children, the eldest of whom, on account of his father's failing health, was appointed Regent, Sept. 25, 1857, and succeeded to the throne as Charles XV on the death of Oscar, July 8, 1859. See Sweden.

OSCAR II (1829–1907). King of Sweden and Norway from 1872 to 1905 and of Sweden alone after that year. He was born in Stockholm, Jan. 21, 1829, being the third son of Oscar I, and succeeded his brother, Charles XV. During his reign the development of the sister kingdoms was retarded by no foreign complications and received an effective stimulus in the efforts of the King. On the question of the vexed relations between Sweden and Norway he firmly opposed all attempts looking towards the dissolution of the union between the kingdoms, but otherwise showed himself in favor of concessions to the Norwegians. When Norway finally severed the union in 1905 the king exerted himself to prevent recourse to hostilities. (See Norway.) He attained some note as a writer, the list of his works including: *Charles XII; Prose Writings;* a number of volumes of lyric poetry; and a translation of Goethe's *Tasso.* His *Samlade skrifter* were published in two volumes in 1875–76 and in seven volumes in 1885–1902. Parts of his writings have been translated into nine languages. In 1857 he married Princess Sophie of Nassau, by whom he had four sons. He was succeeded by his eldest son, Oscar Gustavus Adolphus.

OSCEOLA, ŏs′ē-ō′lȧ (Seminole *As-se-he-ho-lar,* black drink) (c.1804–1838). A famous Seminole chief, born near the Chattahoochee River, Georgia. His father was an English trader and his mother an Indian woman, the daughter of a Creek chief. Removing to Florida when very young, he there acquired great influence among the Seminoles and took the lead in opposition to the territorial aggressions of the whites. In 1835 his wife was reclaimed as a slave by her mother's former owner. For denouncing this outrage to Thompson, the Indian agent, Osceola was put in irons. On being released he began the attacks on the whites which opened the second Seminole War (see Seminole), and in December he killed the Indian agent Thompson. On Oct. 31, 1837, he was treacherously seized while holding a conference under a flag of truce with Gen. Thomas S. Jessup, and was confined at St. Augustine and Fort Moultrie until his death.

OSCHERSLEBEN, ŏsh′ĕrs-lā̇-ben. A town of the Province of Saxony, Prussia, on the Bode, a branch of the Saale, about 24 miles southwest of Magdeburg (Map: Germany, D 2). It has sugar refineries and manufactures agricultural implements, fertilizers, cigars, art goods, spirits, chocolate, bricks, and boilers. In the vicinity are lignite mines. Pop., 1900, 13,400; 1910, 12,931.

OSCILLATION, Centre of. See Centre of Oscillation.

OS′CILLATO′RIA. A genus of blue-green algæ (Cyanophyceæ, q.v.) very commonly studied in laboratories. It is a filamentous colony of cells whose most striking feature is the characteristic swaying, revolving movements of the filaments, suggesting the name.

OS′CILLOGRAPH. An instrument originally devised by William Duddell for observing and recording the character and frequency of electric waves. (See Electricity.) It consists of a special form of galvanometer (q.v.) of very short period having a one-turn coil made of a thin, flat, metallic strip stretched with slight tension in a shunt circuit with a generator or other source of electric waves. The magnetic field of the coil being of constant density, its movements depend in direction and intensity upon the frequency and voltage of the current under test. The strip carries a small mirror from which a beam of light is reflected to a photographic film moving at a known rate of speed. On this same strip of film a curve is made in a similar manner by a current of known voltage and frequency to enable a comparison to be made. Another form of oscillograph consists of a vacuum tube with its terminals connected to a source of high-tension E. M. F. and containing a fluorescent screen opposite the cathode. The bright spot on the screen is observed in a rotating mirror or recorded on a moving film. An alternating current in a coil closely surrounding the tube causes the luminous spot to be drawn out in a curve characteristic of the wave form of the current. This is known as the Braun tube and is useful chiefly in laboratory operations. Consult: H. J. Ryan, "The Cathode Ray Alternating Current Wave Indicator," in American Institute of Electrical Engineers, *Transactions,* vol. xxii (New York, 1903); L. T. Robinson, "The Oscillograph and its Uses," in American Institute of Electrical Engineers, *Transactions,* vol. xxiv (ib., 1905); "Oscillographs, Duddell Type," in the *Electrician,* vol. lvii (London, 1906); Koto Ho "Electrostatic Oscillograph," in the *Electrician,* vol. lxxii (ib., 1913). See Braun, Ferdinand.

OSCINES, ŏs′ĭ-nēz (Lat., singing birds). The great group of Passeres (q.v.), which includes the song birds. They are characterized by several distinct pairs of intrinsic muscles of the syrinx, inserted into the ends of the upper bronchial half rings and constituting thus a complex and effective vocal apparatus. Not all the Oscines sing, but all truly singing birds are Oscines. The side of the tarsus is usually covered with a horny plate, which forms a sharp ridge behind with the corresponding plate of the other side. The primaries are 9 or 10 in number, but when 10 the first is very short. The Oscines are the largest group of birds. Sharpe, in his *Hand-List of Genera and Species of Birds,* not distinguishing between species and subspecies, enumerates 49 families, 1239 genera, and 9696 species out of the grand total of 18,939. Many of the Passeres are of very brilliant plumage, but as a rule the musical powers and intelligence are more noticeable than the beauty, and they are universally regarded as the most highly developed group of birds. Most of them are of comparatively small size. The raven (q.v.) is the largest of the suborder, while the kinglets (see Kinglet) are probably the smallest. Of North American birds about one-half are Oscines. Consult: Stejneger, *Standard Natural History,* vol. iv (Boston, 1885); Newton, *Dictionary of Birds* (ib., 1893–96); Evans, *Birds* (New York, 1900); Knowlton, *Birds of the World* (New World, 1909).

OS′CULATING CIRCLE. In geometry, a

circle that has three, i.e., the greatest possible number, of consecutive points in common with a given curve. A curve can at any given point have more than one tangent circle, i.e., circles with which it may be imagined to have either one or two points in common; but it can, at any given point, have only one *osculating* circle, for only one circle can pass through three given points. The curvature of a curve at a given point is obviously identical with the curvature of its osculating circle at that point, and hence the osculating circle is often spoken of as the circle of curvature of the curve at the given point.

OS'CULA'TION (Lat. *osculatio*, a kissing, from *osculari*, to kiss, from *osculum*, kiss, little mouth, dim. of *os*, Skt. *asya*, mouth). One curve is said to osculate another when the curves have several consecutive points in common, and the degree of osculation depends upon the number of points of contact; i.e., the greater the number of consecutive points in contact, the higher the degree of osculation. The number of possible points of contact is determined by the number of independent arbitrary constants contained in the equation of the tangent curve. The same is true of a straight line and a curve. The equation of a straight line, being of the form $y = mx + c$, contains two arbitrary constants, m and c; hence a straight line can coincide with a curve in two consecutive points, and the contact is said to be of the first order. This straight line is the tangent at the point of contact. When a straight line, not a tangent, meets a curve, there is section instead of contact, and in that case only one point is common to the straight line and the curve. The general equation of the circle, $x^2 + y^2 + dx + ey + f = 0$, contains three arbitrary constants, d, e, and f, and therefore a circle can have three consecutive points in common with a curve, and the contact is of the second order. The circle is known as the circle of curvature or the osculating circle, and has for its radius the radius of curvature of that portion of the curve with which the circle is in contact. No other circle can have so high a degree of contact with a curve at any point as the osculating circle at that point. Surfaces and some twisted curves admit of spheres of osculation. See Curve.

OS'CULATO'RIUM. See Pax.

ÖSEL, *ẽ'zel*, or **OESEL.** A large island in the Baltic Sea, belonging to the Government of Livonia, Russia, and situated at the entrance to the Gulf of Riga (Map: Russia, B 3). It has an area of 1011 square miles. It is irregular in outline, with a long and narrow peninsula extending southward towards the Domesnäs of Courland, and its coasts are indented with numerous small bays, offering, however, few harbors. The surface is undulating, in parts marshy and but sparsely forested. The soil is not unfertile, and the climate is mild enough to permit the cultivation of all the common cereals, including wheat. The chief occupations of the inhabitants are agriculture, fishing, and the rearing of cattle and horses. The population, including that of some small dependent islands, was, in 1913, 66,000, chiefly Esthonians. The principal town, Arensburg, on the southeast coast, with a population, in 1913, of 5000, has a trade in grain, potatoes, and fish. Oesel was occupied by the Knights Swordbearers early in the thirteenth century, and when their power was broken it was sold in 1559 by its Bishop to Denmark. In 1645 it was ceded to Sweden and in 1721 it came into the possession of Russia.

OS'GOOD, Samuel (1748–1813). An American soldier and statesman, born in Andover, Mass. After graduation at Harvard College (1770) ill health compelled him to discontinue theological studies already undertaken and take up mercantile life. Having been a delegate to the Essex County (Mass.) Convention (1774) and active in the Provincial Congress, in 1775 he served as captain of minutemen at Lexington and Concord. For a short time he was aid to General Artemas Ward, but left the army to reënter the Massachusetts Provincial Congress. When a new State constitution, in whose drafting he had assisted, went into force, he was elected a State Senator. From 1780 to 1784 he was a member of the Continental Congress and from 1785 to 1789 first Commissioner of the United States Treasury. He was later Postmaster-General, Speaker of the New York Assembly, State supervisor, and naval officer of New York port. He corresponded extensively with Washington and other leaders, and his letters are valuable for the light they throw upon the political problems of the time.

OSGOOD, William Fogg (1864–). An American mathematician, born in Boston. In 1886 he graduated from Harvard, where, after studying at the universities of Göttingen (1887–89) and Erlangen (Ph.D., 1890), he was instructor (1890–93), assistant professor (1893–1903), and thenceforth professor of mathematics. From 1899 to 1902 he served as editor of the *Annals of Mathematics* and in 1904–05 was president of the American Mathematical Society, whose *Transactions* he edited in 1909–10. Osgood's publications include: *Introduction to Infinite Series* (1897; 3d ed., 1906); *Lehrbuch des Funktionentheorie* (1907; 2d ed., 1912); *First Course in Differential and Integral Calculus* (1907; rev. ed., 1909).

OSGOODE, William (1754–1824). A Canadian jurist, born in England and educated at Christ College, Oxford. He studied law, was called to the bar, and in 1792 went to Upper Canada as its first Chief Justice, that province having been created by the Constitutional Act of 1791. In the organization of the province Osgoode coöperated with his friend Lieutenant Governor John Graves Simcoe (q.v.), but remained in office only until 1794, when he was appointed Chief Justice of the Province of Quebec. Osgoode Hall, the seat of the Supreme Court of Ontario at Toronto, was named after him. Resigning as Chief Justice of Quebec in 1801, he returned to England, where he served as a member of various legal commissions. He published *Remarks on the Laws of Descent* (London, 1779).

OSH, ôsh. A town in the Territory of Ferghana, Russian Turkestan, situated about 60 miles east of Margelan (Map: Asia, Central, P 2). It consists of the old native town and the new Russian settlement and is of some importance in the trade with China. Pop., 1908, 46,782, mostly Mohammedans.

O'SHAUGHNESSY, ô-shạ'ne-sĭ, *or* ô-shạk'ne-sĭ, Arthur William Edgar (1844–81). An English poet, born in London, March 14, 1844. In 1861 he was appointed assistant in the library of the British Museum; two years later he was transferred to the department of natural history, a post which he held till his death, Jan.

30, 1881. His verse comprises: *The Epic of Women and Other Poems* (1870); *Lays of France* (1872), based upon the *lais* of Marie de France; *Music and Moonlight* (1874); *Songs of a Worker* (posthumous, 1881). The first volume especially contains pieces of great beauty. O'Shaughnessy belonged to the Neo-Romantic school, more completely represented by William Morris and Swinburne. In 1873 he married Eleanor, daughter of Westland Marston. She died in 1879. In collaboration with her he wrote *Toyland* (1875), a collection of tales for children. Consult L. C. Moulton, *O'Shaughnessy: His Life and his Work* (Chicago, 1894).

OSHAWA, ŏsh′ȧ-wȧ. A town and port of Ontario County, Ontario, Canada, on Lake Ontario and on the Grand Trunk, Canadian Pacific, and Canadian Northern railways and the Toronto and Eastern Electric Railway, 34 miles northeast of Toronto and 6½ miles east of Whitby (Map: Ontario, G 6). It has an armory, Carnegie library, hospital, and two parks. Its industrial establishments include steel works, foundries, and manufactories of carriages, automobiles, steam and gas fittings, malleable iron, textiles, metal work, woolens, leather, pianos, contractors' and builders' material, and white wear. The town owns its water works. The Trent River supplies power for electric lighting. Pop., 1901, 4394; 1911, 7436.

O'SHEA, ō-shā′, MICHAEL VINCENT (1866–). An American educator, born at Le Roy, N. Y. He graduated at Cornell University in 1892, taught in the State Normal School at Mankato, Minn., in 1892–95, and, after serving as professor of education in the Buffalo Teachers' College, in 1897 was appointed to a like chair in the University of Wisconsin. He became prominent in university-extension work and as a lecturer on pedagogy. In 1911–12 O'Shea was president of the Society of College Teachers of Education. His publications include: *Aspects of Mental Economy* (1900); *Education as Adjustment* (1903; 7th ed., 1912); *Chapters on Method and Management in Teaching* (1903); *Dynamic Factors in Education* (1906); *Linguistic Development and Education* (1907); *Social Development and Education* (1909); *Every-Day Problems in Teaching* (1912); *Child and his Spelling* (1914), with W. A. Cook; *Health and Cleanliness* (1915), with J. H. Kellogg. O'Shea became editor of the *Wisconsin Journal of Education* and associate editor of the *School Review*.

OSHIMA, ō′shē-mä′ (Jap., big island). The name of at least 20 places in Japan. The two most important are: (1) The most northerly of the "Seven Islands of Idzu," which stretch southward for 100 miles towards the Bonin Islands, best known to foreigners as Vries Island (Map: Japan, F 6). It is of volcanic origin, is 8 miles long and 5 wide, has a good harbor and an ever-smoking volcano, Mihara-Yama. It has a population of about 5000, living in six villages along the coast. The people live principally by fishing and exporting cherry-tree wood to the main islands of Japan. A little corn and some sweet potatoes are raised. The women do most of the work and, as in the Luchus, carry their burdens on their heads. Their dress differs considerably from the dress of the women of the mainland; they wear petticoats, dress their hair differently, and do not blacken their teeth. The men dress as other Japanese. Concubinage does not exist, musical instruments are not found, and dancing is unknown. (2) Anami-Oshima, one of the large islands of the Luchu Archipelago (see LUCHU), which came under the control of the Daimyo of Satsuma in 1609 (Map: Japan, H 6). It is 34 miles long and 17 wide, is of volcanic origin, with steep shores, and hills rising to heights of 1400 to 1500 feet. The port is Naze, with a good harbor, on the north coast. The inhabitants suffer much from very poisonous snakes of the genus *Trimeresurus*, which infest even the houses.

OSH′KOSH. A city and the county seat of Winnebago Co., Wis., 81 miles north by west of Milwaukee, on Lake Winnebago, at the mouth of the Upper Fox River. Its business is served by freight lines on the lake and river and by three railroads—the Minneapolis, St. Paul, and Sault Ste. Marie, the Chicago and Northwestern, and the Chicago, Milwaukee, and St. Paul (Map: Wisconsin, E 4). It is the seat of a State normal school. In the suburbs, 3 miles distant, is the Northern Hospital for the Insane (State), and near it the County Asylum for the Incurable Insane, a tuberculosis sanitarium, and the County Poor Farm. There are two fine parks—Menominee and South. Among the notable structures are several public-school buildings, the city hall, public library, county courthouse, and the United States government building. Oshkosh has achieved distinction as a centre of sculptural art. There are a magnificent bronze group erected in memory of the Civil War soldiers, an heroic bronze figure of the Indian chief Oshkosh, and a statue of Carl Schurz. Lake Winnebago is a popular resort for yachting, ice boating, fishing, and hunting. Owing to the accessibility of valuable forests, Oshkosh has developed important lumber interests and manufactures products of lumber in great variety—sash, doors, and blinds, matches, furniture, trunks, carriages and wagons, etc. Other manufactures are machinery, boilers, grass twine and matting, flour, tobacco, and malt liquors. The city's commercial interests are increasing and include a large wholesale trade. The commission form of government has been adopted, providing for a mayor and two councilmen, each elected for a term of six years. Oshkosh was settled in 1836 and chartered in 1853. In 1859, 1866, 1874, and 1875 it suffered severely from fires. Pop., 1900, 28,284; 1910, 33,062; 1914 (U. S. est.), 35,097.

OSIANDER, ō′sē-än′dẽr, ANDREAS (1498–1552). A German reformer. He was born Dec. 19, 1498, at Gunzenhausen, near Nuremberg. Osiander, whose real name was Hosemann, was educated at Ingolstadt and Wittenberg and became a preacher at Nuremberg in 1522, where he was conspicuously active in introducing the Reformation. He advocated the views of Luther in his controversy with Zwingli on the question of the Lord's Supper, took part in the conference held at Marburg (1529), and was present at the Diet of Augsburg (1530). In 1548 he was deprived of his office as preacher at Nuremberg, because he would not agree to the Augsburg Interim (see INTERIM), but was immediately invited by Albert, Duke of Prussia, to become the head of the theological faculty in the newly established University of Königsberg. He was hardly settled here when he became entangled in a theologial strife that embittered his naturally imperious and arrogant temper. In the treatises *De Lege et Evangelio* (1549) and *De*

Justificatione (1550) Osiander asserted that the righteousness by which sinners are justified is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, as the impartation of a real righteousness, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q.v.). A seemingly amicable arrangement between the disputants was brought about by Duke Albert in 1551, but the strife was soon recommenced, Osiander publishing new writings in which he attacked Melanchthon; nor did his death in Königsberg, Oct. 17, 1552, put a stop to the war of words. It was continued by his followers, called Osiandrists, who were finally extinguished by the *Corpus Doctrinæ Prutenicum* (in 1567), which caused their banishment from all parts of Prussia. The leader of the party, the court preacher Johannes Funck, Osiander's son-in-law, was beheaded (1566). Osiander's descendants have furnished a remarkable number of churchmen and scholars. Consult his *Life* by Wilkin (Stralsund, 1844) and Möller (Elberfeld, 1870).

OSIER, ō′zhẽr (OF., Fr. *osier*, from Gk. *οἶσος*, *oisos*, *οἴσυον*, *oisyon*, *οἰσύα*, *oisya*, sort of osier; connected with Gk. *ἰτέα*, *itea*, Lat. *vitex*, withy, *vitis*, vine, OPruss. *vitvo*, OHG. *weda*, Ger. *Weide*, AS. *vēpig*, Eng. *withy*). The popular name of the bushy willows used for making wickerwork. Their long and slender branches are valuable in proportion to their length, slenderness, suppleness, and toughness. The common osier, *Salix viminalis*, a European species common in wet alluvial grounds, sometimes becomes a tree, although when cultivated for hoops and basket making it is not permitted to do so. It is often planted to prevent the washing of river banks. It has several cultivated varieties much more useful than the original or wild species, which are apt to break and therefore are of little value. More suitable for the fine kinds of basket making are *Salix purpurea*, sometimes called the fine basket osier, and a variety known as the green-leaved osier or ornard, and *Salix triandra*, known to English osier cultivators and basket makers as the Spanish rod. A variety known as the Lemley willow, *Salix pentandra*, is highly recommended for osiers. It is said to thrive on sandy soils better than any other osier willow. The Caspian willow, *Salix daphnoides*, yields fine soft rods that split readily. *Salix alba*, which sometimes becomes a tree, is the golden osier or golden willow, remarkable for the bright yellow of its branches, as well as for their pliancy and toughness. There are other species, such as *Salix caprea*, *Salix lucida*, and *Salix fragilis*, which are also valuable; but the osiers chiefly cultivated belong to the species which have been named, or are very nearly allied to them. The species most planted in the United States are: *Salix amygdalina*, *Salix purpurea*, and *Salix pentandra* vars. Since some of the European species do not stand the American climate very well, *Salix sericea*, *Salix petiolaris*, *Salix lasiandra*, and *Salix lævigata*, all American species, have been recommended for growing in the United States.

Osiers are extensively cultivated on alluvial soils, especially on the tide-flooded river basins of Holland, Belgium, and France, whence large quantities of rods are exported. Much depends on the closeness of planting, as when space is too abundant the shoots of many of the kinds branch more than is desirable. When osiers for the finest kinds of basket work are desired single-eye cuttings are planted close together, so as to obtain weak but fine shoots. For ordinary work cuttings 15 to 16 inches long and of tolerably thick branches are planted in rows from 18 inches to 2 feet apart and at distances of 15 to 18 inches in the row. Osier plantations in light soils continue productive for 15 or 20 years, and much longer in rich, alluvial soils. Clay soils are unsuitable. Usually no cultivation is required after planting, although shallow cultivation is recommended to keep down the weeds. The shoots are cut once a year, during the resting period. They are then sorted, and those intended for brown baskets are dried and stacked, out of danger of rain, care being also taken to prevent heating, to which, like hay, they are liable, and by which they would be rendered worthless. Osiers intended for white baskets cannot at once be peeled, but after being sorted they are tied in bundles, placed upright in wide shallow trenches or rivulets in which there are about 4 inches of water, till they begin to bud and blossom in spring. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a break, but in cold seasons it is sometimes necessary to lay them for a while under a quantity of litter. They may also be peeled by steaming or boiling the dried shoots. There are extensive plantations in the vicinity of Rochester and Liverpool, N. Y.; Detroit, Mich.; Milwaukee, Wis.; Cincinnati, Ohio; and Baltimore, Md. The consumption of domestic-grown willow rods in 1907 was 2,282,000 pounds, an increase of 26.9 per cent over 1906. The United States Census for 1910 gives the value of the manufactures of baskets and small wares of willow and rattan as $5,695,356, an increase of 42.7 per cent over 1899. Consult *United States Department of Agriculture, Farmer's Bulletin, 622.*

OSIMO, ō′zē-mō. An episcopal town of central Italy in the Province of Ancona, 8 miles south of Ancona (Map: Italy, D 3). It has a fourteenth-century cathedral, a bishop's palace, a museum containing many statues and ancient inscriptions, a technical school, a seminary, and a library. The chief industry is silk spinning. Osimo is the ancient Auximum, founded by the Romans in 157 B.C. Pop. (commune), 1901, 18,475; 1911, 18,808.

ŌSI′RIS (Lat., from Gk. Ὄσιρις, from Egypt. *Hesri*, *Ausar*, *Asiri*). One of the principal Egyptian deities, originally the local god of Abydos and Busiris, who early acquired a solar character and was identified with the setting sun. He thus came to be regarded as the ruler of the realm of the dead in the mysterious region below the western horizon. According to the legend Osiris was the son of Seb (the earth) and Nût (the sky) and the husband of his sister Isis. When he came to rule over Egypt he found the people plunged in utter barbarism and raised them from their wretched condition by giving them laws, teaching them to till the ground, and instructing them in the worship of the gods. He then traveled over the whole world, spreading the blessings of civilization in every land. His wicked brother Set (Typhon), the enemy of all good, would have taken advantage of his absence to undo his work and subvert the order he had established, but was defeated by the watchfulness of Isis. When the

King returned, however, Set plotted to destroy him by treachery. Having privily taken the measure of Osiris' body, he made a beautiful chest of like dimensions and brought it with him to a great feast at which Osiris was present. As though in jest he promised to give the chest to any one whose body should fit it exactly. After a number of the guests had tried in vain, Osiris got into the chest and lay down, when Set and his confederates quickly shut the lid and fastened it securely. They then cast it into the river, and it was borne out to sea by the Tanitic mouth of the Nile. Isis, after long wanderings, found her husband's body and brought it back to Egypt, but while she went to visit her young son Horus it was discovered by Set, who tore it to pieces and scattered the fragments far and wide. Upon learning of this misfortune, Isis took a boat and carefully sought out the scattered members of her husband. Wherever she found a portion of the body she buried it, and the spot was ever thereafter revered as sacred ground. When Horus grew up he took vengeance upon the murderer, Set, and ascended his father's throne. Osiris meantime lived again in the underworld and became the ruler of the dead. At a very early period the worship of Osiris was connected with the Egyptian doctrine of the immortality of the soul and became popular throughout Egypt. Abydos, where the head of the god was believed to be preserved, enjoyed the reputation of special sanctity, and bodies were brought from all parts of Egypt for burial in its sacred soil. Osiris is usually represented swathed in mummy cloths, holding in his hands the crook and the flail, symbols of royalty, and wearing upon his head the atef crown, which was formed of the tall crown of Upper Egypt with a long feather on each side. Consult: K. A. Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); E. A. T. Wallis Budge, *The Gods of the Egyptians*, vol. ii (London, 1904); A. Erman, *Die Aegyptische Religion* (Berlin, 1905). See also Horus; Isis; Serapis; Set; and the paragraph on *Religion* in the section on *Ancient Egypt*, and Plate of Egyptian Deities, under Egypt.

OSKALOOSA, ŏs'kȧ-lōō'sȧ. A city and the county seat of Mahaska Co., Iowa, 63 miles southeast of Des Moines, on the Burlington Route, the Chicago, Rock Island, and Pacific, and the Minneapolis and St. Louis railroads (Map: Iowa, E 3). It is the seat of Oskaloosa College (Christian), the National Holiness University, and Penn College (Friends), opened in 1873, and has a public library and a United States government post-office building. An artistic bronze statue of Chief Mahaska is situated in the public square. The yearly meetings of the Society of Friends in Iowa are held here. The city has manufactures of wagons, steam and hot-water heaters, flour, packed meat, woolen goods, vitrified brick, fire hydrants, furnaces, overalls, silos, culverts, caskets, and iron and brass goods. In the vicinity are deposits of coal, which is extensively mined, besides fire clay and limestone. There are also large agricultural and stock-raising interests. Settled in 1843, Oskaloosa was incorporated 10 years later. Pop., 1900, 9212; 1910, 9466; 1914 (U. S. est.), 9572.

OSLER, ŏs'lẽr, Britton Bath (1839–1902). A Canadian lawyer, brother of Sir William Osler and of Sir Edmund Boyd Osler. He was born in Simcoe County, Ontario, and was educated at Barrie, and in law at Toronto University. Called to the bar in 1862, he practiced his profession first at Dundas and afterward at Hamilton until 1882, when he removed to Toronto. There he became a member of a prominent law firm, soon gaining a large practice in the civil courts, but also winning wide celebrity in criminal cases, his ability in cross-examination and in addresses to juries being of a very high order. He acted for the Dominion government in the trial of Louis Riel (q.v.) for high treason in 1885, and also in a prolonged contest with the Canadian Pacific Railway; for the Canadian House of Commons in 1891 in obedience to its order, in proceedings involving cases of political corruption; and he was prosecuting counsel in a long list of notable murder cases, in some of which his speeches were of remarkable power and eloquence. In politics he was a Liberal, though often taking an independent attitude.

OSLER, Sir Edmund Boyd (1845–). A Canadian financier and legislator, brother of Sir William Osler and of Britton B. Osler. He was born in Simcoe County, Ontario, began his business career in the Bank of Upper Canada, Toronto, and afterward became head of the firm of Osler and Hammond in that city. Widely known as a financial authority, and president of or director in a large number of banking and industrial corporations, he was also one of the pioneers in railway development in Ontario, becoming a director of the Canadian Pacific Railway and identifying himself prominently in its financial management. Osler was one of the Canadian representatives at the Imperial Congress of Chambers of Commerce in London in 1896, and in the same year was elected Conservative member for West Toronto in the Canadian House of Commons. He was one of the most prominent opponents of the Taft-Fielding reciprocity agreement in 1911. In 1912 he was knighted.

OSLER, Sir William (1849–). A physician and author, who lived for many years in the United States and afterward in England. A brother of Sir Edmund B. Osler and of Britton B. Osler, he was born at Bondhead, Ontario. He was educated at Trinity University, Toronto, at the medical school of McGill University, Montreal (where he graduated in 1872), and in London (University College), Berlin, and Vienna. In 1874 Osler became professor of physiology and pathology at McGill, in 1884 professor of clinical medicine at the University of Pennsylvania, in 1889 professor of principles and practice of medicine at Johns Hopkins University and chief physician to Johns Hopkins Hospital. He served as president of the Association of American Physicians in 1895. Appointed (1905) regius professor of medicine at Oxford and Thomas Young lecturer on medicine at St. George's Hospital, London, he resided in England thereafter. In 1911 he was created Baronet. In an address widely quoted and distorted, made on leaving America, Osler mentioned "the comparative uselessness of men over 40 years of age" and said, "Take the sum of human achievement in action, in science, in art, in literature; subtract the work of the men above 40, . . . we should practically be where we are to-day." Osler's work touched nearly every field of medicine. He was one of the first to describe blood platelets, wrote on cerebral palsies of children, on chorea, on cancer of the stomach, diseases of the spleen and liver, etc. An able organizer and an attractive teacher, he surrounded himself with students who soon formed a school of medicine known wherever the English tongue is spoken. In 1914–15 Osler was actively engaged in supervising the general medical preparedness of the British forces in the European War, and helped to organize and equip the Queen's Canadian Military Hospital. Much of his time he devoted to writing, not only on technical medical subjects, but also in the fields of medical history, biography, and the philosophical essay. He published: *Histology Notes* (1882); *Cerebral Palsies of Children* (1889); *The Principles and Practice of Medicine* (1892; 8th ed., 1912); *Science and Immortality* (1904); *Counsels and Ideals* (1905); *An Alabama Student* (1908); *A Way of Life* (1914). He also edited *A System of Medicine* (1910; 2d ed., 1914).

OSMAN, ŏs-män′. See Othman.

OSMAN DIGNA, dĭg′nȧ (c.1836–1900). A follower of the Mahdi in the Sudan. He was born, according to some, at Suakin, while others give his birthplace as Rouen, France, and his father as a Scotchman named Nisbet. According to this latter account the family moved in 1849 to Alexandria, where the father soon died, and the widow married a Turk named Osman, who adopted young Nisbet and called him Osman Ali. Osman Ali's business of slave selling being broken up by the English, he took part in the revolt of Arabi Pasha (q.v.), and after the failure of that movement he attached himself to the cause of the Mahdi. About this time he received the name Digna because of the fullness of his beard. He maintained himself at the head of a powerful army around Suakin and inflicted a severe defeat on Baker Pasha near Tokar, southeast of that place, on Feb. 4, 1884. Immediately after this victory, however, he was defeated by General Graham near Tokar and at Tamanieb. As the Mahdi's ablest general he was largely responsible for the fate of Gordon and the loss of the Sudan to the English. In December, 1888, he suffered a bloody reverse at the hands of General Grenfell at Suakin, where he lost an arm. In 1899 he fought in the last campaign of the Mahdist forces, whose strength had been broken the previous year at Omdurman. On Jan. 19, 1900, he was captured near Tokar and sent a prisoner to Rosetta.

OSMANIE, ŏs-mä′nê-ȧ, Order of. A Turkish order conferred for conspicuous service to the state. It was established by Abd ul Aziz on his accession to the throne in 1861.

OSMAN′LIS. See Turkey.

OSMAN NURI PASHA, ŏs-män′ nōō′rê pȧ-shä′ (1837–1900). A Turkish general, called Ghazi (the victorious). He was born at Amasia in Asia Minor. He was educated for the army at the Turkish military academy, became a subaltern officer in 1854, and fought in the Crimean War. He took part in the suppression of the rebellion of the Druses (1860) and in that of the Cretan insurrection of 1867–69. He was made a general of brigade in 1874 and in the following year a general of division. When Servia made war upon the Ottoman Empire in 1876 he was put in command of a corps of 35,000 men at Widin, and his successes won him the rank of marshal. In July, 1877, he took up a strongly fortified position at Plevna, thus arresting the advance of the Russians. He inflicted three defeats on them between July 20 and 30, and successfully withstood a desperate assault made by them and their Rumanian allies on September 11. He held his position until his supplies failed him, and at last on December 10 made a gallant effort to break through the enemies' lines. Overpowered by superior numbers, he was forced to surrender. He was taken to Russia as a prisoner of war, but after the Treaty of San Stefano (1878) returned to Constantinople and became commander in chief of the Imperial Guard. He was Minister of War (1878–85) and grand marshal of the palace till his death, which occurred at Constantinople in April, 1900. Consult Levaux, *Ghazi Osman Pacha* (Paris, 1891). See Russo-Turkish War.

OSMAN′THUS. A genus of trees and shrubs belonging to the family Oleaceæ. There are about a dozen species of *Osmanthus* in North America, Japan, China, Himalayas, Polynesia, etc. In China *Osmanthus fragrans* is cultivated for its fragrant flowers, which are said to be used to perfume tea, and it is cultivated elsewhere as a hothouse or garden ornamental. *Osmanthus americanus*, known as devilwood, is a tree of southeastern United States that sometimes attains a height of 30 to 50 feet and a trunk diameter of about 1 foot. The wood is heavy, hard, strong, and close-grained. The heartwood is dark brown in color and the sapwood yellow or light brown. *Osmanthus aquifolium* is a Japanese evergreen species that is grown somewhat as an ornamental in the United States. It is hardy with some protection as far north as Baltimore.

OSMIUM, ŏs′mĭ-ŭm *or* ŏz′mĭ-ŭm (Neo-Lat., from Gk. *ὀσμή*, *osmē*, *ὀδμή*, *odmē*, odor, from *ὄζειν*, *ozein*, to smell). A metallic element discovered by Tennant in 1803. It is one of the platinum metals and is found native alloyed with platinum and with iridium. When osmiridium, which is found as a hard, crystalline substance (insoluble in aqua regia) in platinum ores, is heated to a white heat in porcelain tubes in a current of air, the volatile oxide of osmium (OsO_4) readily sublimes over. Metallic osmium may be obtained from the oxide by reducing the latter with hydrogen, carbon monoxide, or carbon.

Osmium (symbol, Os; atomic weight, 190.9) is a lustrous, blue-white metal with a specific gravity of about 22.5. It melts at about 2400° C. (about 4350° F.). Its compounds with oxygen include a monoxide (OsO), a sesquioxide (Os_2O_3), a dioxide (OsO_2), and the tetroxide (OsO_4) mentioned above. The tetroxide is the only one of the oxides that is volatile. Osmic acid, H_2OsO_4, is known in the form of a number of its salts, called osmates; the existence of the free acid itself is doubtful. Osmium forms three distinct chlorides—a dichloride, $OsCl_2$; a trichloride, $OsCl_3$; and a tetrachloride, $OsCl_4$. Of these the last two form double salts known respectively as chlorosmites and chlorosmates.

OSMO′SIS (Neo-Lat., from Gk. *ὠσμός*, *ōsmos*, impulsion, from *ὠθεῖν*, *ōthein*, to push). This phenomenon, which is discussed in its fundamental form and from the physical point of view under Solution, plays an important part in plant physiology. The plant cell, consisting of a mass of protoplasm surrounded by a somewhat tough but flexible and elastic membrane, the cell wall, and inclosing a watery fluid, the cell sap, is an appropriate mechanism for an effective display of osmotic phenomena, which are fundamental to three important functions: (1) turgor (q.v.), (2) absorption and transfer of water, (3) absorption and transfer of dissolved substances. (See ABSORPTION IN PLANTS.) The general principles set forth under SOLUTION may be summarized with respect to plants as follows: (*a*) Dissolved substances diffuse to the limits of the solvent and exert an osmotic pressure comparable to gas pressure and manifesting in great part the same laws. (*b*) The osmotic pressure of several nonreacting substances in solution together equals the sum of the pressures of each solute upon the given volume of solvent. (*c*) Osmotic pressure may be made evident by interposing a membrane between solutions of unequal pressure, the solvent freely passing, while the solutes are hindered or prevented. (*d*) In plants water is the sole solvent. The plant cell is an osmotic apparatus. The cell wall is ordinarily permeable to both solvent and solutes, but the protoplasm is a semipermeable membrane with respect to many solutes. Under normal conditions, therefore, when water is available, it enters the cell and allows the osmotic pressure of the solutes to manifest itself in pushing the protoplasmic membrane against the cell wall until the elastic resistance of the wall balances the pressure. A cell with wall distended is said to be turgid. The presence of solutes in the water within the semipermeable membrane of protoplasm in the surface cells of the root demands the entrance of water from the outside until an equilibrium is reached. But the attainment or maintenance of equilibrium is constantly prevented by the evaporation of water from surfaces exposed to the air; for when water evaporates from a cell the elastic resistance of the cell wall is no longer equal to the osmotic pressure and water enters from a neighboring cell, and so on, corresponding action making possible the movement of water from more and more remote cells until the turgor is equalized by the entrance of water from without. (See CONDUCTION.) The absorption of solutes from water in contact with the plant is independent of the movement of water. If by removal from the cell sap, either by use or by transformation, the osmotic partial pressure of any solute within the cell be diminished, other molecules of this solute may gain entrance. Provided the protoplasm be permeable to it, the entrance of any solute depends on a disturbance of the equilibrium between the osmotic partial pressure of that substance inside and outside the cell.

Since the osmotic pressure of solutions of acids and salts (electrolytes) is greatly increased by their electrolytic dissociation (see DISSOCIATION), which occurs in watery solutions, this must be an important factor in plant life. Normally all the solutions surrounding the plant are dilute watery solutions in which the extent of such dissociation is considerable. The solutions within the plant cell, too, contain solutes in a state of electrolytic dissociation. In considering the osmotic phenomena within the plant, therefore, allowance must be made for the increase of osmotic pressure due to electrolytic dissociation.

Recently nonliving semipermeable membranes in plants have been receiving much attention and are proving to be of considerable physiological importance. There is no doubt that the assumed general permeability of the cell wall, primary and modified, is at error in many cases, and that protoplasm has been given too great a place in controlling the osmotic exchanges of the plant. It has long been known that roots of the beet, bulbs of the onion, and many other plant organs bearing an abundance of soluble food materials can remain long in contact with wet soil without perceptible loss of food. This was formerly supposed to be due entirely to protoplasmic semipermeable membranes, but we now know that more or less cuticularized surface cell walls are the effective membranes in preventing leaching. Such membranes are common in seed coats, especially of wild plants, and in part explain the ability of these seeds to be in water or wet soil for years without injury from leaching. The ability of many seeds to endure long storage in high concentration of copper sulphate and other poisonous salts is due to these membranes, and the power of *Penicillium* to thrive in 20 per cent copper sulphate is probably related to the permeability of the wall rather than that of the protoplasm.

The important work done in the plant by osmotic pressure has led to many measurements of the amount of this force in all sorts of plants under a great variety of conditions. The plasmolytic and freezing-point methods have been the main ones used. The former consists in finding the concentration of aqueous solutions of sugar, potassium nitrate, etc., that will produce the least noticeable plasmolysis (q.v.) and from the known osmotic pressures of these solutions determining that of the cells. It is necessary in the use of this method to employ plasmolytic agents to which the protoplasm is not permeable and by which it is not injured. Correction must also be made for concentration of the cell sap with water withdrawal down to the point when the wall ceases to contract, and for the contraction or so-called central pressure of the protoplast. The former correction is of greatest meaning in young, very elastic tissue and the latter in very small cells. For a description of the freezing-point method, see SOLUTION. Plant juices are best extracted for this method by immersing the tissue for a while in liquid air. This destroys all living semipermeable membranes and allows the unrestricted pressing out of solutes along with the water. The osmotic pressure of plant cells and tissues varies with different ecological groups, with different tissues of the same individual, and with the same tissues under different conditions. Rarely cells show a pressure of 2 to 3 atmospheres. Commonly, however, the pressure ranges from 7 to 25 atmospheres. There are cases when it equals or greatly exceeds 100 atmospheres, as in certain pollen grains, leaves of some desert plants, and organisms growing in concentrated solutions of sugar or salts. Such cells often burst when placed in distilled water, on account of the speed and force with which water is absorbed. Leaves generally have considerably higher osmotic pressure than roots, and the former on hot sunny days than at night. Many organisms have the power of accommodating their osmotic pressures to that of the surrounding medium.

Consult: Alexander Findlay, *Osmotic Pressure* (New York, 1913); J. C. Philip, *Physical Chemistry: Its Bearing upon Biology and Medicine* (ib., 1913); H. N. Morse, *Osmotic Pressure of Aqueous Solutions*, published by the Carnegie Institution (Washington, 1914); Ludwig Jost, *Lectures in Plant Physiology*, translated by Gibson (2d Eng. ed., Oxford, 1914).

OS′MUN, Thomas Embley, best known by his pen name, Alfred Ayres (1834–1902). An American orthoëpist and critic. He was born in Montrose, Summit Co., Ohio, and was educated at an academy in Cleveland, Ohio, at Oberlin College, and in Paris and Berlin, where he spent six years. Returning to America in 1859, he settled in New York, where he engaged in newspaper and magazine work and became well known as a dramatic critic. His extensive writings on orthoëpy and elocution were highly popular. In 1891–94 he was employed on the staff of the *Standard Dictionary*. Among his published works are: *The Orthoëpist* (1880); *The Verbalist* (1881); *The Mentor* (1884); *The Essentials of Elocution* (1886); *Acting and Actors* (1894); *Some Ill-Used Words* (1901).

OSMUN′DA (ML., water fern). A genus of ferns giving name to the Osmundaceæ (royal fern family), characterized by bearing the sporangia in panicles, whose branches represent modified pinnæ. *Osmunda* is the only representative of the family in North America, where three of the eight species occur. They are tall (2–6 feet) swamp or lowland ferns, the leaves in large clusters, the blades bipinnatifid or bipinnate, and the sporangium-bearing portions contracted. *Osmunda regalis* (royal fern) occurs from Newfoundland to Florida, west to Minnesota, Nebraska, and Saskatchewan. It is distinguished from the other species by its bipinnate blades. *Osmunda cinnamomea* (cinnamon fern) occurs from Newfoundland to Minnesota, south to the Gulf States and New Mexico, and is distinguished by its bipinnatifid blades and the tuft of rust-colored wool at the base of the pinnæ. *Osmunda claytoniana* (Clayton's fern) occurs from Newfoundland to Minnesota, south to North Carolina, Kentucky, and Missouri, and is distinguished by bipinnatifid blades lacking the rusty wool at base of pinnæ.

OSNABRÜCK, ŏs′nȧ-bry̆k′. An ancient town in the Province of Hanover, Prussia, situated on the Hase, about 30 miles northeast of Münster (Map: Prussia, C 2). It consists of the old, irregularly built town, surrounded by promenades laid out on the site of the ancient fortifications, and the well-planned new quarter with numerous handsome buildings. The thirteenth-century Roman Catholic cathedral is a partly Romanesque and partly Transitional building surmounted by three towers. The Gothic Marienkirche dates mainly from the fifteenth century. In the Rathaus (fifteenth century) the preliminary negotiations for the Peace of Westphalia were carried on.

The educational institutions comprise two Gymnasia (of which one, the Gymnasium Carolinum, was founded by Charlemagne), a seminary for priests, two teachers' seminaries, a new theatre, two libraries, and a valuable museum. Industrially Osnabrück is among the most important towns of Hanover. It has extensive iron and steel foundries, rolling and wire mills, and manufactures various kinds of machinery, boilers, pipes, nails, pianos, organs, rugs, mattresses, cotton goods, cordage, leather, celluloid, chemicals, paper, bricks, tobacco, and lumber. A railway repair shop is established here. In the vicinity are stone quarries and large coal mines. The trade is important in local manufactures and in grain, meats, and cattle. Pop., 1900, 51,574; 1910, 65,957.

Osnabrück received mint, market, and custom privileges in 888, and was surrounded with walls in 1082. Although constituting a part of the bishopric of Osnabrück, founded by Charlemagne at the end of the eighth century, it enjoyed practical independence and became a member of the Hanseatic League. In accordance with the provisions of the Peace of Westphalia the bishopric of Osnabrück was held alternately by Roman Catholics and Protestants until its secularization in 1803. In 1857 the Roman Catholic bishopric was reëstablished. Consult: Mithoff, *Kunstdenkmäler und Altertümer im Hannoverschen*, vol. vi (Hanover, 1879); *Osnabrücker Geschichtsquellen*, edited by the Historischer Verein von Osnabrück (1891 et seq.); Würm, *Osnabrück, seine Geschichte, etc.* (ib., 1906).

OSORIO, ō-sō′rē-ō, Manoel Luiz (1808–79). A Brazilian general, born near Pelotas, Rio Grande do Sul. He took part in the civil war of 1839–45 in his native province, fought in the Uruguayan campaign of 1851–52, and from 1865 to 1869, when he was disabled in action, served with distinction in the war with Paraguay. During this war he was commander in chief (1865–66) and in 1867 was made lieutenant general. Osorio entered politics, became Senator in 1877, and from 1878 to his death was Minister of War, but his great fame was as the brave and dashing cavalry leader who won from his soldiers the title of *O legendario* (the fabulous).

OSORNO, ō-sôr′nō, Marquis of. See O'Higgins, Ambrosio.

OSPREY, ŏs′prā (from OF. *orfraie*, from Lat. *ossifragus*, osprey, bone breaker, from *os*, bone + *frangere*, to break), or Fish Hawk. An accipitrine bird, which represents the genus *Pandion* and the family Pandionidæ and differs from the ordinary falcons in the reversible owl-like outer toe, the lack of an aftershaft to the feathers, the long, closely feathered tibiæ, and other structural details, and in its habit of feeding exclusively on live fish caught from the water. The osprey is cosmopolitan, except in some oceanic islands, but is everywhere local, as it is not able to live far from the shores of bodies of water or large rivers. The typical form is that of the Old World (*Pandion haliaëtus*), of which the American fish hawk and an Australian fishing eagle are regarded as geographical races.

The American fish hawk is about 2 feet long. It is of a dark brown color, variegated with white, gray, and black; the under parts are white except a light brown band across the breast. The bill is short, strong, broad, and strongly hooked. The tail is rather long and the wings extremely long. The soles of the feet are very rough and covered with small pointed scales which enable it to secure a firmer hold on its slippery prey, which it seizes with its talons alone and bears away to its nest or to a perch. It is often robbed of its gains by the bald eagle, which loves fish but is unskillful in catching them.

The nest of the fish hawk is a huge, stick-built affair (a load for a cart) placed on a sea-fronting cliff or in a tree—in the United States usually the latter, and the same structure may be repaired and reoccupied for many seasons. So attached are they to their nesting site that when the tree is broken down by an excess of weight the birds will often continue to nest among the débris on the ground. In favorable places colonies of fish hawks may nest in company, and they have occasionally nested upon platforms placed upon tall poles for their accommodation. Another feature of interest is that other birds, notably the American grackles, often build their nests in the outer interstices of the osprey's rough structure and dwell there undisturbed. The eggs (two to four) are white, blotched with claret brown, purplish, and ochre. Excellent accounts of the fish hawk are given in the books of Wilson, Nuttall, Audubon, and other of the older ornithologists, as well as in modern treatises on birds. See Plate of EAGLES AND HAWKS.

OS'RHOE'NE, or **OSROENE** (Gk. Ὀσροηνή). An ancient kingdom and territory in Mesopotamia. According to Pliny it was situated between Commogene (q.v.) and Adiabene (q.v.), east of the Euphrates and west of the Tigris. In this wider sense it includes, not only Edessa (q.v.) and the country immediately surrounding this city, but also Harran (q.v.), Nisibis, Reshoina and other towns with the territory adjacent to them. Osrhoene enjoys the distinction of being the first state which adopted Christianity as its official religion. This was done in 201 A.D. The independence of the state ended in 244 when it was incorporated in the Roman empire.

OS'SA (Lat., from Gk. Ὄσσα). The ancient name of a mountain in northeastern Thessaly, separated from Olympus by the vale of Tempe. It is now called Kissavos. The conical summit is 6398 feet high. According to Homer the young giants, Otus and Ephialtes, planned to pile Ossa on Olympus and Pelion on Ossa in order to reach heaven. See ALOADÆ.

OS SACRUM. See SACRUM.

OSSEIN, ŏs'sē-ĭn (from Lat. *os*, bone). A substance allied to gelatin and forming the organic part of bones. It is obtained by the prolonged action of dilute hydrochloric acid on bone, which dissolves all the inorganic matter. The material thus obtained retains the form of the bone without its hardness, and must be repeatedly washed with water and treated with alcohol and ether to remove traces of salts, fat, etc. It is insoluble in water, but is converted into gelatin by the action of boiling water—a transformation which is much facilitated if a little acid be present. Hawk and Gies have shown that ossein is made up of three distinct substances, collagen, mucoid, and albumoid. These may be separated with the aid of an unsaturated solution of calcium hydroxide and water.

OSSETES, ŏs'ĕts *or* ŏs-sĕts'. A people of the Kazbek region in the central Caucasus. According to Dirr they number 127,000. The Ossetes seem to be somewhat above the average in stature, with subbrachycephalic head form, and largely without the prepossessing physical characters of some of the other peoples of the Caucasus. Ripley (1899) is inclined to regard the Ossetes as immigrants from the direction of Iran; their own tradition, however, brings them from the region of the Don in southeastern Russia. Moreover, as Vsevolod Miller has shown, the Ossetic language alone explains a great many South Russian place names. The Ossetes call themselves Iron, which has been identified with Iran (Eran). (See OSSETIC LANGUAGE.) Their religion is a mixture of Christianity and Islam. Family life is strong, but the married woman (though girls are consulted for marriage) has a rather servile position. Detailed information about the Ossetes will be found in Haxthausen, *Transcaucasia* (London, 1854); Miller, *Osetinskie Etiudy* (Moscow, 1881–87); Von Erckert, *Der Kaukasus und seine Völker* (Leipzig, 1887); Chantre, *Recherches anthropologiques dans le Caucase* (Paris, 1885–87); Kovalevski, "The Customs of the Ossetes," in the *Journal of the Royal Asiatic Society* for 1888; Giltchenko, *Materialy dlia antropologii Kavkaza* (St. Petersburg, 1890); Dirr, "Anthropologische und ethnographische Uebersicht über die Völker des Kaukasus," in *Petermanns Mitteilungen*, vol. lviii (Gotha, 1912).

OSSETIC (ŏs-sĕt'ĭk) **LANGUAGE.** A modern Iranian language spoken in the central part of the Caucasus. In its phonology it resembles Armenian (q.v.) in many respects, but these similarities are to be regarded as accidental coincidences. In structure the language, like the other modern Indo-Iranian vernaculars, is analytic in type. The noun has 10 cases, formed by postpositions (e.g., *lăg*, man, *lăgă*, to the man, *lăji*, of the man, *lăjĭmă*, with the man, while the plural *lăgtă*, men, has the corresponding forms *lăgtăn*, *lăgti*, *lăgtĭmă*). The verb has three tenses, present, preterite, and future, and four modes, indicative, imperative, optative, and subjunctive. Compound tenses and a passive voice are formed, as in many other languages, by the participles and the verb *ŭum*, to be (e.g., *undĭstŭt*, ye were cursed). Ossetic has two main dialects, Tagaurish, Ironish, or Irish, in the northeast, with a subdialect Tualish in the south, and Digorish or Dugorish in the northwest. By far the most important linguistically is Tagaurish. The Ossetic has but a scanty literature, although rich in folk tales. The Psalms and most of the New Testament have been translated into it. The Russian alphabet is often employed, although the Armenian is the more common.

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OS'SETT. A municipal borough in the West Riding of Yorkshire, England, on the Calder, 3 miles west of Wakefield. Its staple industry is the manufacture of woolens. Coal is extensively mined in the neighborhood. The town owns its water supply and maintains a free library, technical school, and sewage works. It has a mechanics' institute, a fine modern church, and mineral springs. Pop., 1901, 12,903; 1911, 14,078.

OSSIAN, ŏsh'an, more correctly **OISÍN**, or **OSSÍN**, ō'shēn. A legendary character of Irish literature whose exploits are connected with historical events of the last days of heathendom in Ireland. As time went on poems about Oisín spread over Ireland and Scotland. The whole cycle underwent changes in individual poems. The tradition was embellished and more and more it grew to resemble fairy lore. According to the evidence of these largely fragmentary or late poems and of the prose romances, Oisín belongs to the third century A.D. and to Ireland. King Cormac MacArt had a son-in-law Finn (or Fionn) mac Cûmhail, who commanded the Fianna or Fenians, a sort of prætorian guard of the royal chieftain, among whom were Finn's son Oisín, his grandson Oscar, and another grandson Caoilte (or Caillte). Cormac is said to have died in 266. His successor, Carbery, or Cairbre, thought the Fenians a danger to his throne. Civil war arose. Carbery slew Oscar. The Fenians were crushed in 293 at the battle of Gabhra. Oisín and his cousin Caoilte fled, and we find them, only 150 years later, in the company of St. Patrick, through whose ministrations they die baptized, according to some forms of the legend. The "Story of Oisín in the Land of the Young" makes him pass long years in fairyland. It is possible to distinguish three periods in the Oisín cycle: (1) The ancient, recorded in fragments older than the twelfth century, of which there may be altogether some 100. (2) The mediæval, containing documents chiefly of the twelfth century, of which the most important is the *Acallamh na Senorach* (*Colloquy of the Elders*), a chaos of local legends, of prose and verse, the latter apparently the more ancient, and bearing somewhat the relation to the former, in diction, that the *Elder Edda* does to the *Younger*. The work of this period is more patriotic, chauvinistic even, than are the ancient fragments. It expresses hatred for the foreigner, under the guise of Fenian opposition to the Lochlannach. Another noteworthy characteristic is that woodcraft plays a greater part and there is more appreciation of nature than earlier. (3) The postmediæval Ossianic documents are mainly in verse. The wilder forms of nature become prominent in them, and many of the songs are defiantly and dramatically pagan, as though in scorn of the sour fanaticism of Patrick, who is quite transformed from the genial saint of the earlier period. The first examples of the cycle in this stage are to be found in Dean McGregor's *Book of Lismore*, a compilation of 1518 or perhaps earlier. But Irish and Scotch tales of Oisín and the Fenians continued to be sung and told in the seventeenth, eighteenth, and even in the nineteenth century. The last deliberate contribution to the Oisín cycle was Michael Comyns's *Oisín in Tír na N-Og*, which, as it was written about 1750, is by an odd coincidence almost exactly contemporary with Macpherson's (q.v.) dislocated mosaic of phrases from Ossianic poems coupled with those of other cycles and set in a modern and rather cheap paste, which he published as "Ossian." Yet the reaction against Macpherson's poems has been too strong. In Macpherson's work landscape plays a very great part; in the Oisín cycle a very small one. It may be noted too that Macpherson confounds heroes of the cycle of Cuchullin with the Fenians and makes both contemporaries of the Northmen of the eighth century. (See MACPHERSON.) It is doubtful if any fragment of verse by Oisín remains. Poems are first attributed to him in twelfth-century manuscripts. Indeed, the origin, authorship, date, historical background, and even the existence of the hero are all matters of uncertainty and debate.

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OSSIAN-NILSSON, ŏs′sĭ-ȧn-nĕls′sŏn, KARL GUSTAF (1875–). A Swedish poet and writer of romances. Born at Lund, he was educated at the university of his native city and became a teacher. In 1900 he published *Fem dikter* and *Masker*, which brought him literary recognition. These were followed by *Hedningar* (1901); *Ornar* (1902); *Svart och hvitt* (1904); *Amerikaner och byzantiner* (1905); *Orkester* (1907); *Flygskeppet* (1910); *Prästgården* (1911), an idyl, the best of which showed him a poet of much ability. He showed himself a champion of the oppressed and at the same time a hero worshiper. Among his romances are: *Barbarskogen* (1908; 7th ed., 1913), which caused much stir; *Slätten* (1909); *Hafvet* (1910); *Odets man* (1912); *Lille Benjamin* (1913). In 1912 appeared *Fågel Fenix*, a drama in verse.

OS′SIFICA′TION (from Lat. *os*, bone + *facere*, to make). The vital process by which calcareous matter is deposited in cartilage or membrane, giving rise to bone. At a very early period of embryonic life, as soon as any structural differences can be detected, the material from which the bones are to be formed becomes mapped out as a soft gelatinous substance, which may be distinguished from the other tissues by being rather less transparent and soon becoming decidedly opaque. From this beginning the bones are formed in two ways: either the tissue just described becomes converted into cartilage, which is afterward replaced by bone (intracartilaginous ossification), or a germinal membrane is formed, in which the ossifying process takes place (intramembranous ossification). The latter is the more simple and rapid mode of forming bone. When ossification commences the membrane becomes more opaque and exhibits a decided fibrous character, the fibres being arranged more or less in a reticulated manner. These fibres become more distinct and granular from impregnation with lime salts and are converted into incipient bone, while the cells which are scattered among them shoot out into the bone corpuscles, from which the canaliculi are extended, probably by resorption.

In intracartilaginous ossification, at the point where ossification begins the cartilage cells arrange themselves into rows and become separated by the growth of the matrix in which they lie. A deposit of calcareous material now takes place between the rows of cartilaginous cells and the cartilage assumes a granular and opaque appearance. While this process is going on in the centre a thin layer of bone is being formed between the surface of the cartilage and the vascular membrane covering it—the periosteum—by the agency of cells called osteoblasts, in much the same way that intramembranous ossification takes place. From this outer shell prolongations consisting of osteoblasts and blood vessels penetrate towards the centre of the cartilage and form the permanent canals through which the bone is nourished. All the bones of the body except those of the face and the vault of the cranium are formed in cartilage. Certain bones at the base of the skull, as the occipital, are formed partly in cartilage and partly in membrane.

True ossification sometimes occurs as a pathological process. The osseous tissue that is formed in regeneration of destroyed or fractured bones may be regarded as due to a morbid, although a restorative, action. Hypertrophy of bone is by no means rare, being sometimes local, forming a protuberance on the external surface, in which case it is termed an exostosis, and sometimes extending over the whole bone or over several bones, giving rise to the condition known as hyperostosis. Again, true osseous tissue occasionally occurs in parts in which, in the normal condition, no bone existed, as in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, etc.), in the tendons of certain muscles, and in certain tumors.

OS'SINING (formerly SING SING). A village in Westchester Co., N. Y., 31 miles north of New York City, on the east bank of the Hudson River and on the New York Central and Hudson River Railroad (Map: New York, B 2). It is a popular residential place, beautifully situated at the widest part of the Hudson, Tappan Bay, and commanding from its elevated site fine views. It has a public library, several private boarding schools, the Roman Catholic Foreign Mission Seminary of America, and a soldiers monument. The arch of the Croton Aqueduct, 88 feet in span and 70 feet above water, with a subjacent arched highway bridge, is an interesting feature. The Sing Sing State Prison, located just south of the village, is one of the most prominent in the United States. There are extensive manufactures of machinery, foundry products, porous plasters, pills, etc. Under a revised charter adopted in 1897 the government is vested in an annually elected president and board of trustees. There are municipal water works. Pop., 1900, 7939; 1910, 11,480; 1914 (U. S. est.), 12,987. Settled about 1700 on part of the Philipse Manor, Sing Sing, named probably from the Sin Sincks Indians, was incorporated as a village in 1813. In 1901 the name was changed to Ossining after several attempts had been made, the former name having become objectionable owing to its association with the prison. Consult Scharf, *History of Westchester County* (Philadelphia, 1886).

OS'SOLI, MARCHIONESS. See FULLER, (SARAH) MARGARET.

OSTADE, ŏs'tȧ-de, ADRIAEN VAN (1610–85). An eminent Dutch genre painter. He was born in Haarlem in December, 1610, and was a pupil of Frans Hals. He was, however, more influenced by his fellow pupil Brouwer, like whom he painted in cool neutral colors tavern scenes from peasant life during what may be called his first manner, which lasted till about 1640. He endeavored to render the artistic effect of the whole, giving little detail and using generalized, caricatured types. His second manner is marked by richer color and by chiaroscuro effects, which show, especially in his interiors, the influence of Rembrandt. He paints more restful scenes, games, conversation pieces, and the like. The element of the landscape also enters his art, which had heretofore been confined to interiors. From 1650 to 1670 he was at the height of his powers, after which his pictures become cooler in tone, though the colors are brighter and the execution is more detailed. He lived prosperously, having been dean of the Painters' Guild and a member of the civic guard. He died at Haarlem, April 27, 1685. His younger brother was Isaak van Ostade.

According to De Groot more than 900 of his paintings survive, of which there are numerous examples in the galleries of northern Europe. Of the paintings of his first period, representing tavern scenes, there are good specimens in the private galleries of Vienna and Cassel and in the public collections of Munich and Dresden. Among the works of his best period are the "Hurdy-Gurdy Man before a Peasant's Cottage" (1640) and "Peasant Company," in the Berlin Museum; "Interior of a Cottage" (1642), "The Village School," and "The Schoolmaster," in the Louvre; "A Tavern Scene" (1660), "Peasants Smoking," "The Painter in his Studio," and others in the Dresden Gallery; and a number of excellent examples in Buckingham Palace, London. To his best period also belong a number of admirable single genre figures like the "Baker," "Fiddler," "Hurdy-Gurdy Man," and the three "Senses," at St. Petersburg; the "Merchant" and "Man Reading," in the Louvre; "The Smoker" (Antwerp) and the "Herring Eater" (Brussels); and a fine portrait group wrongly supposed to be the painter and his family, in the Louvre. There are good examples of his later period at Amsterdam, The Hague, Cassel, and Dresden. In American collections he is represented in the Metropolitan Museum, New York (three pictures), the New York Historical Society (two), the Widener (five) and Johnson (three) collections, Philadelphia, the Art Institute, Chicago (two), and elsewhere. Ostade was also an etcher of some distinction, having left about 50 plates treating of peasant subjects, most of them dated 1646 or 1647, a period at which he was under the influence of Rembrandt.

Bibliography. The biographies by Gaedertz (Lübeck, 1869) and Lemcke, in Dohme, *Kunst und Künstler* (Leipzig, 1878); also Bode, *Adriaen van Ostade als Zeichner und Maler* (Vienna, 1881); Van der Wiele, *Les frères van Ostade* (Paris, 1893); Springer, *Des radierte Werk von Adriaen van Ostade* (Berlin, 1899); Rosenberg, *Adriaen und Isaak van Ostade* (Bielefeld, 1900); Hofstede de Groot, *Catalogue of Dutch Painters*, vol. iii (London, 1910).

OSTADE, Isaac van (1621–49). A Dutch genre and landscape painter. He was born at Haarlem and was a younger brother and the principal pupil of Adriaen van Ostade, from whose works it is difficult to distinguish his early unsigned paintings. He soon developed an independent style, the chief characteristics of which are warmth and harmony of color and an admirable impasto, his productions comparing favorably with his brother's painted at a like period of his development. In his independent paintings one of his favorite subjects is traveling parties, consisting of men and horses, resting before a tavern, the charming landscape being the most attractive feature. Of this subject there are examples in the galleries of Amsterdam, Buckingham Palace (London), Berlin, the Louvre, and St. Petersburg. His other chief specialty is winter scenes, represented in fine gray harmonies, in which he usually introduces the frozen canals with the national Dutch amusements of skating and sleighing. Of this variety there are three good examples in the Louvre and others in the National Gallery, London, the Metropolitan Museum, New York, and in the galleries of Antwerp, St. Petersburg, and Dresden. A third subject, in which the figures rather than the landscapes are the principal part, are groups of peasants sitting in front of taverns or house doors, of which the chief examples are "The Spinner," in the Brussels Museum, and "The Fiddler," in Buckingham Palace. Van Ostade left in all about 400 paintings, many of which are in private possession in England. In the United States he is represented in the Metropolitan Museum (two) and in the Frick and Blodgett collections, New York, and the Johnson (two) and Widener (one) collections, Philadelphia. His drawings are no less excellent and carefully executed than his paintings. He died at the height of his power, aged 28, and was buried Oct. 16, 1649, in Haarlem. Consult the authorities referred to under Ostade, Adriaen van.

OSTA'RIOPHY'SI (Neo-Lat. nom. pl., from Gk. *ὀστάριον, ostarion*, little bone, dim. of *ὀστέον, osteon*, bone + *φῦσα, physa*, bladder). A group of teleost fishes which includes the great majority of the living fishes of the world. This group is characterized, according to Jordan, by the modification of the anterior vertebræ, which are coössified and have some of their lateral and superior elements detached to form a chain of small bones, the Weberian ossicles, which connect the air bladder with the ear. It is composed of three orders, Nematognathi, Plectospondyli (q.v.), and Scyphophori, which are regarded as descended from a common stock.

OSTASHKOV, ŏs-tăsh'kôf. A district town in the Government of Tver, Russia, on the east shore of Lake Seliger, 162 miles northwest of Tver (Map: Russia, D 3). Among its public institutions are a library and a theatre. It is especially known as a tanning centre and has extensive bootmaking interests. Other industries are boat building and the manufacture of hardware and agricultural implements. Pop., 1897, 10,457; 1910, 10,812.

OSTEITIS, ŏs'tē-ī'tĭs (Neo-Lat., from Gk. *ὀστέον, osteon*, bone + *-ῖτις, -itis*). Inflammation of bone. As in the case of other tissues the bones may undergo inflammation as the result of injury, infection with pus germs, or from systemic diseases such as syphilis and tuberculosis. In surface inflammations the periosteum is implicated and the condition is then known as osteoperiostitis. Where the inflammation is deep the bone marrow is generally involved, the process then being known as osteomyelitis. A peculiarity of purulent bone inflammation is the tendency towards separation and casting off of portions en masse, these pieces being known as sequestra. (See Necrosis.) Acute osteitis may terminate in resolution or sclerosis, the latter resulting in obliteration of the canaliculi, so that the tissue becomes exceedingly dense and hard. See Paget's Disease.

OSTEND, ŏs-tĕnd' (Flem. and Fr. *Ostende*). A famous watering place on the North Sea on the west coast of Belgium, in the Province of West Flanders, 14 miles west of Bruges (Map: Belgium, A 3). It is the second port in the Kingdom and is connected by canal with Bruges and Ghent. Ostend is the terminus of branch railway lines connecting with the great continental systems and is a station for daily steamers between England and the Continent. It is beautifully laid out as a fashionable summer resort. The Kursaal, the centre of life in the season, overlooks the Digue, or dike, on which is placed the beach promenade. There are a park and a race course. The surf bathing is excellent. The harbor works are on a fine scale, embracing a number of basins and two new inner harbors, completed in 1905. They are entered by a channel about 100 yards wide. Ostend has a large fishing fleet, and the culture of oysters is carried on in the so-called oyster parks. Ostend endured a memorable siege by the Spanish from 1601 to 1604, when it finally surrendered to Spinola. During the European War which broke out in 1914 Ostend was captured and partially destroyed by the Germans. It was bombarded several times by the allied aërial fleet. After the capture of Brussels it was temporarily the capital of Belgium. (See War in Europe.) Pop., 1901, 39,484; 1910, 42,207; 1912, 43,002. Consult Beaucourt de Noortoelde, *Ostendeana (814–1900) ou la reine des plages*, vols. i–ii (Ostend, 1900).

OSTEND COMPANY. A trading corporation founded by the Emperor Charles VI in 1722 and chartered by him in the following year. As ruler of the former Spanish Netherlands it was his ambition to make Ostend a great port on the northern waters, as Trieste was on the Adriatic Sea, and to obtain for the Empire a share in the lucrative trade with the East Indies; hoping, too, that the merchant marine thus created would become the nucleus of an Imperial navy. Soon after its incorporation as the Ostend East India Company settlements were founded at Covelong on the southeast coast of India and Bankipur on the Hugli. To further his schemes which, after the confirmation of the Pragmatic Sanction, was his favorite project, the Emperor sought the assistance of Spain, whose coöperation was obtained in the second Treaty of Vienna (1725). The maritime powers, especially England and Holland, regarded this intrusion on their trade monopoly with resentment, and in 1727 the Emperor was compelled to suspend the operations of the company for seven years and by the second Treaty of Vienna in 1731 to abolish it.

OSTEND MANIFESTO. A dispatch drawn up at Ostend, Oct. 9, 1854, and signed by James Buchanan, John Y. Mason, and Pierre Soulé, at that time the United States ministers to Great Britain, France, and Spain respectively, declaring that the sale of Cuba would be as advantageous and honorable to Spain as its purchase would be to the United States, but if Spain refused to sell, self-preservation required that it be wrested from her by force. They advised offering for it $120,000,000. Encouraged by the acquisition of Texas, the proslavery leaders had been affording ready assistance to filibustering expeditions directed against the islands of the Spanish West Indies, and especially Cuba. These expeditions and the probable future action of the Federal government in regard to the island created anxiety in Europe, and in 1852 Great Britain and France addressed a joint note to the United States proposing a tripartite convention by which the three Powers should disclaim all intention to obtain possession of Cuba and should discountenance such attempts by any Power. Everett, then Secretary of State, replied, refusing to accede to such an arrangement, while declaring that the United States would never question Spain's title to the island. President Pierce in August, 1854, directed the American ministers resident at London, Paris, and Madrid to meet at some convenient point for discussion of the Cuban question. They met at Ostend, October 9, and subsequently at Aix-la-Chapelle, though it was at the former place that the memorandum known as the Ostend Manifesto was prepared.

The declaration was not approved in the United States in the platform of either party, and it was strongly condemned in Europe. It was chiefly the work of Soulé, who exerted a powerful influence over his colleagues. Consult: M. W. Cluskey, *Political Text-Book* (Philadelphia, 1860); Henry Wilson, *History of the Rise and Fall of the Slave Power* (3 vols., Boston, 1872–77); T. C. Smith, *Parties and Slavery* (New York, 1906); J. F. Rhodes, *History of the United States from the Compromise of 1850*, vol. ii (ib., 1896).

OSTENFELD, ŏs′ten-fĕld, Carl Emil Hansen (1873–). A Danish botanist, born at Randers and educated at the University of Copenhagen, where he gained the doctorate in 1906. In 1895–96 he was a member of the Ingolf expedition to Davis Strait. Ostenfeld became inspector of the botanical museum of the University of Copenhagen (1900), foreman for the Topographic-Botanical Study of Denmark, member of the International Commission for Study of the Sea and director of its plankton laboratories (1902). Among his works are: "Plantevækstem paa Færöerne" in *Botany of the Faroes* (3 vols., 1901–08), in which he also wrote the section on plankton; *Flora arctica*, i (1902); *Nordens Flora* (1901–07); *Planteverdenen i Menneskets Tjeneste* (1906), the two last with Dr. A. Mentz; *De danske Farvandes Plankton* (1913); and articles on Arctic and Northern plants and plankton.

OSTEN-SACKEN, ŏs′ten-säk′ken, Baron Charles Robert (1828–1906). A Russian diplomatist and entomologist. He was born Aug. 21, 1828, in St. Petersburg, where he was educated, and in 1849 entered into the service of the Imperial Foreign Office. In 1856 he was appointed Secretary of Legation in Washington and in 1862 Consul General of Russia in New York. He resigned his post in 1871, but remained in the United States until 1877, when he went to reside in Heidelberg. He devoted the best years of his life to working up the Diptera (flies) of North America, partly in collaboration with H. Loew, and otherwise exerted an immense influence in extending entomological studies in North America. Besides many papers of a systematic, critical, and historical nature, Baron Osten-Sacken published two catalogues of North American Diptera, also elaborate monographs on different families of flies.

OSTEN′SORY. See Monstrance.

OS′TEOL′EPIS (Neo-Lat., from Gk. *ὀστέον, osteon*, bone + *λεπίς, lepis*, scale). A fossil crossopterygian fish found in the Old Red Sandstone of the Scottish Devonian.

OSTEOL′OGY (Gk. *ὀστεολογία*, from *ὀστέον, osteon*, bone + *-λογία, -logia*, account, from *λέγειν, legein*, to say). The science which treats of the anatomy, development, and relation of bones and bony tissue. See Bone; Skeleton.

OS′TEO′MA. See Tumor.

OS′TEOMALA′CIA (Neo-Lat., from Gk. *ὀστέον, osteon*, bone + *μαλακία, malakia*, softness, from *μαλακός, malakos*, soft), Mollities Ossium, or Malacosteon. A disease of adult life, characterized by progressive softening of the various parts of the skeleton, with resulting deformities. It is very rarely seen in children or old persons. In the great majority of cases it affects women, chiefly those who have borne children or who are pregnant. It has been attributed to the action of many causes, such as defective nutrition, excess of lactic acid, disease of the trophic nerves, ovarian and uterine changes, etc.; in many cases the real exciting cause is uncertain. According to Erdheim the parathyroid bodies have a possible relation to osteomalacia, since these glands preside over calcium metabolism. Pathological changes have been observed in the parathyroids in cases of osteomalacia. While mild cases occur in all parts of the world the disease is especially prevalent in certain parts of Italy, Austria, South Germany, and Switzerland.

The changes in the bony tissue are: great increase in vascularity, with resulting hemorrhages; degeneration of the medulla or the marrow of the bone, so that it finally becomes converted into a pulplike substance; destruction of the cancellous or spongy tissue of the bone, so that cavities or tumor-like enlargements result. The periosteum is ordinarily thicker and more vascular than normal and serves as a protecting envelope to the softened bone. Fracture of the bone from slight causes is of frequent occurrence, and deformity, sometimes very excessive and peculiar, is sure to be produced in severe cases.

Until deformity has occurred, or until at least the softening has advanced so far as to permit of the bone being bent, the diagnosis is difficult and uncertain, since the progress of the disease is for a long time an insidious one. Because of the early developed and persistent pain the affection may be mistaken for rheumatism;

but the multiplicity of painful areas, the sex of the patient, the existence of pregnancy, and the presence of large quantities of the salts of lime in the urine should direct suspicion to osteomalacia. Though this disease may not for a time exert any unfavorable influence upon life, the prognosis is grave. However, it occasionally ceases to advance, and it has even been overcome. Medical treatment—the use of phosphorus and the phosphates, the lime salts, cod-liver oil, etc.—has proved of little value. The best possible hygienic surroundings should be secured and the patient kept quiet and free from pain. Proper retentive dressing should be applied to prevent fracture and lessen deformity. It is reported that in some cases the removal of the ovaries has been beneficial. Thyroid extract and adrenal substance have occasionally proved beneficial, and Hoffmann used the serum of sheep whose thyroid glands had been removed. In any event pregnancy should be prevented, as childbearing exerts a powerful influence upon the progress of the disease. See Big Head.

OS′TEOMY′ELI′TIS (Neo-Lat., from Gk. *ὀστέον*, *osteon*, bone + *μυελός*, *myelos*, marrow). An inflammation, usually acute, of the marrow of the bone, extending to the bone itself, and due to infection by a pyogenic organism. It may follow a wound which exposes the medullary canal to the air, such as a compound fracture, a gunshot injury, or an amputation; or the infective material may be introduced through the blood. The entire shaft of the bone may be involved. The symptoms are severe aching pain, exquisite tenderness, and deep swelling of the soft parts over the bone. A purulent discharge, containing fragments of dead bone and tissue sloughs, makes its appearance. There is a high fever in severe cases, with chills and sweats.

Children are subject to an acute form of the disease, which is sometimes called acute epiphysitis because it begins at the epiphyseal line and involves the epiphysis. A strain occurs at this point and inflammation ensues. The femur and tibia are the bones oftenest affected, and the knee or hip joint becomes involved and filled with pus. The disease may sometimes be mistaken for rheumatism.

The treatment of this malady, which is a very fatal one, is purely surgical.

OS′TEOP′ATHY (from Gk. *ὀστέον*, *osteon*, bone + *πάθος*, *pathos*, suffering, disease). A system, method, or science of prevention and cure of disease without the use of drugs, but by the control of nature's remedial agents (blood, lymph, and nerve force) which are already in the body. By this system, method, or science the free and unobstructed distribution and application of these agents (which are necessary for health) are accomplished mainly by scientific chirurgics. The principles were first discovered and formulated in 1874 by Dr. Andrew T. Still, an old-school physician, at Baldwin, Kans. The first college was opened at Kirksville, Mo., in 1892, since which time seven other colleges have been established in the United States. All subjects taught in regular medical colleges are taught in osteopathic colleges, but from a different viewpoint, except materia medica, for which is substituted osteopathic theory and practice. The course of study covers a period of three years of nine months each. The practice of osteopathy has been legalized in the United States and its dependencies. There are about 7000 practitioners in the United States and Canada.

Osteopathy holds that the body has been endowed by nature with all the remedial agents necessary for the preservation of health and recovery from disease, providing the mechanism which distributes these agents is in perfect mechanical adjustment. It reasons that a normal flow of blood is health, for the life is the blood, and that any obstruction to such flow is possible disease; that the removal of such obstruction constitutes scientific cure. Osteopathy holds that all tissues of the body will act according to their design when free from obstructions, but that any interference with the forces or fluids of the body constitutes the lesion that produces disease. These lesions may be osseous, ligamentous, muscular, or nervous, as a result of concussions, contusions, etc., improper diet, exposure and unhygienic environment, or abnormal mental states. Search is made for the structural abnormality, and mechanical readjustment restores harmonious activity to the mechanism, when the curative powers resident in the body itself, left free to act, are sufficient to rebuild and restore health. While osteopathy, strictly speaking, is anatomical corrective work, yet it employs such other agencies as dieting, nursing, and hygiene. Osteopathy recognizes various specific microörganisms as exciting agents of many acute diseases, but it also asserts that in many of these diseases there are predisposing lesions that weaken certain areas of the body and permit the entrance and growth of these exciting organisms. Osteopathy recognizes that surgical treatment is at times necessary and in well-selected cases should be employed. The medical profession in general accept the theories and principles of osteopathy only to a limited extent, classing it with massage, Swedish movement, etc., acknowledging its value in certain cases, but denying that any such method can be applied to all diseases. Their objection is therefore not so much against the method itself as against its universal application. The American Osteopathic Association was founded in 1897. There are about 20 periodicals, mostly monthlies.

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OS′TEOPORO′SIS. See Big Head.

OSTERHAUS, ŏs′tẽr-hous, Hugo (1851–). An American naval officer, born at Belleville, Ill. After graduating from the United States Naval Academy in 1870 he was promoted through the successive ranks to commander in 1901, captain in 1906, and rear admiral in 1909. He was stationed at the Naval Academy in 1892–95, in 1897–99, and in 1901–03; commanded the *Culgoa* in 1901, the *Monterey* in 1903–04, the *Cincinnati* in 1904–05, and the *Connecticut* in 1907; served as a member of the Board of Inspection and Survey in 1905–07; and was flag officer of the second division of the Atlantic fleet in 1910 and commander-in-chief of that fleet in 1911. Osterhaus was retired in 1913.

OSTERHAUS, Peter Joseph (1823-). A German-American soldier, born in Coblenz, Germany. After serving for some time as a Prussian army officer he emigrated to the United States and settled in St. Louis. At the outbreak of the Civil War he was appointed a major of the Second Missouri Volunteers, and during the first year of the war was employed in Missouri and Arkansas, where he took a conspicuous part in the battles of Wilson's Creek (Aug. 10, 1861) and Pea Ridge (March 7–8, 1862). In 1863 he commanded a division before Vicksburg, and at Chattanooga (November 23–25) he aided General Hooker in the capture of Lookout Mountain. He was then assigned to General Sherman's army, and after the capture of Atlanta received command of the Fifteenth Corps, one of the four corps into which the army was consolidated. He was mustered out of the service on Jan. 15, 1866, and the same year was appointed United States Consul at Lyons, France, but subsequently made his home in Germany, at Duisburg. He retired from the army in 1905, and was in 1915 the oldest pensioner on the army list.

OSTERHOUT, ôs′tẽr-hout, Winthrop John Vanleuven (1871-). An American botanist, born in Brooklyn, N. Y. In 1893 he graduated from Brown University, where he taught botany in 1893–95, and in 1894–95 taught also at Woods Hole, Mass. Then for a year he studied at Bonn, in 1899 receiving his Ph.D. from the University of California, of whose faculty he remained a member until 1909. Osterhout was assistant professor of botany at Harvard in 1909–13 and thereafter professor. His publications include *Experiments with Plants* (1905; Ger. trans., 1909) and *Agriculture for Schools of the Pacific Slope* (1909), with E. W. Hilgard.

OSTERMANN, ôs′tẽr-män, Andrei Ivanovitch, Count (1686–1747). A Russian diplomat, born in Bochum, Westphalia, where he was christened Heinrich Johann Friedrich. He studied at Jena, whence he fled, because he had killed his opponent in a duel, to Holland, and there met Peter the Great and entered the new Russian navy. He enjoyed Peter's favor, negotiated the treaties of the Pruth in 1711 and Nystad in 1721, became Baron, and in 1725 Vice Chancellor to Catharine I, who made him a member of the regency during Peter II's minority. Under the Empress Anna Ivanovna he was appointed Minister of Foreign Affairs (1730), and he kept the good will of Anna Leopoldovna when she became Regent, only to fall into disfavor with Elizabeth, who charged him with urging her exclusion from the succession and with the suppression of Catharine's will. He was sentenced to death, reprieved on the scaffold (1742), and banished to Siberia, where he lived in seclusion the rest of his life.

OSTERMAN-TOLSTOY, Alexander Ivanovitch, Count (1770–1857). A Russian general. He entered the army when he was a boy, fought bravely in the Turkish campaign of 1790, and in 1805 commanded the Russian corps which, with Swedish and English divisions, attempted military operations in northern Germany. As commander of the Fourth Army Corps in 1812 and 1813 he fought at Bautzen, where he was wounded, and he lost his left arm at Kulm. He remained in active service, however. till 1817.

OSTERODE, ôs′te-rō′de. A town in the Province of East Prussia, Germany, on Lake Drewenz, 75 miles southwest of Königsberg (Map: Prussia, J 2). It is an ancient town with a castle built by Teutonic knights in 1270, a Gymnasium, and a seminary for teachers. It has railway shops, machine works, saw mills, distilleries, brickkilns, and a municipal slaughterhouse, and trades in grain, lumber, and cattle. Pop., 1900, 13,163; 1910, 14,364.

OSTERODE. A town in the Province of Hanover, Prussia, situated in the Harz, 34 miles by rail northwest of Nordhausen (Map: Germany, D 3). Its church of St. Ægidius, founded in the eighth century and rebuilt in 1578, contains tombs of the princes of Grubenhagen. The manufactures of the town include woolen, cotton, and knit goods, machinery, metal, cigars, leather, white lead, lumber, and wrought copper. Pop., 1910, 7502.

OSTHOFF, ôst′hôf, Hermann (1847–1909). A German comparative philologist, with Brugmann (q.v.) the head of the "new grammarians." He was born at Billmerich in Westphalia, studied at Bonn, Tübingen, and Berlin, and, after teaching in a Gymnasium at Cassel from 1871 to 1874, became connected with the University of Leipzig in 1875. In 1877 he was named assistant professor and the following year professor of Sanskrit and comparative grammar at Heidelberg. He was one of the founders and editors of *Morphologische Untersuchungen auf dem Gebiete der indogermanischen Sprachen* (5 vols., 1878–90; vol. vi, 1910) and wrote: *Forschungen im Gebiete der indogermanischen nominalen Stammbildung* (2 vols., 1875–76); *Zur Geschichte des schwachen deutschen Adjectivums* (1876); *Das Verbum in der Nominalkomposition* (1878); *Zur Geschichte des Perfekts im Indogermanischen* (1884); *Vom Suppletivwesen der indogermanischen Sprachen* (1900); *Etymologische Parerga* (1901); "Gab es einen Instr. Sing. auf -mi im Germanischen," in *Indogermanische Forschungen* (vol. xx, 1906); *Bilder aus Irland* (1907). He died in Heidelberg.

OS′TIA. An ancient city of Latium, at the mouth of the Tiber, 15 miles from Rome. It is said to have been founded by Ancus Marcius and was regarded as the oldest Roman colony. It first acquired importance from its salt works, the establishment of which is attributed to Ancus Marcius, and afterward was the port where the Sicilian, Sardinian, and African grain shipped for Rome was landed. It is mentioned as a trading port in connection with the year 354 B.C.; it was an important naval station during the Second Punic War. It was long the principal station of the Roman navy; but its harbor was exceedingly bad, and gradually the entrance became silted up with alluvial deposits, so that vessels could no longer approach it, but were compelled to ride at anchor and disembark their cargoes in the open roadstead. At length the Emperor Claudius dug a new harbor or basin 2 miles north of Ostia and connected it with the Tiber by a canal. (See Claudian Harbor.) It was named the Portus Augusti, and around it soon sprang up a new town called Portus Ostiensis, Portus Urbis, Portus Romæ, and often simply Portus (modern Porto). The work of Claudius was carried further by Trajan. After the fall of the Roman Empire Ostia declined rapidly, and in the eighth century it was a mere ruin. During the Middle Ages a village, the modern Ostia, was built about ½ mile above the site of the ancient town, but it has not more than about 1000 permanent inhabitants, who still carry on the manufacture of salt. Ostia has the reputation of being the seat of the earliest bishopric save that of Rome, and the Cardinal Bishop of Ostia (and Velletri) is dean of the Sacred College. The ruins of the ancient Ostia, excavated first towards the end of the eighteenth century, then again in 1854, and finally, with more care and thoroughness, since 1880, extend for 1½ miles along the banks of the Tiber, and are nearly 1 mile in breadth. The ancient town is well preserved, so that the ruins are second in importance only to those of Pompeii. They comprise a forum containing a temple and bounded by a theatre, a Mithræum, baths, villas, walls, well-preserved warehouses, etc. Many inscriptions of interest and importance have been found. Consult: R. A. Lanciani, *Ancient Rome in the Light of Recent Discoveries* (Boston, 1889); the periodical *Notizie degli Scavi*, passim, published by the Reale Accademia dei Lincei (Rome, annually); K. Baedeker, *Central Italy and Rome*, pages 490–493, with plan (15th Eng. ed., Leipzig, 1909); L. R. Taylor, *The Cults of Ostia* (Bryn Mawr, 1912), summarized and reviewed in *The Classical Weekly*, vii, 143–144 (New York, 1914); the article "Ostia" in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

OS′TIAKS. A name which seems to have been applied at first to the primitive Finnic peoples of the middle cis-Uralian upland valleys by the Russians and afterward extended to trans-Uralian tribes as far as the Yenisei. The etymology of the name is uncertain, and its ethnological value has been different with different writers and at different periods. According to Sommier the Ostiaks of the Obi are short in stature, spare in form as contrasted with the robuster or even fat Samoyeds, with brachycephalic head form and a considerable percentage of dolichocephaly. Their skin is quite white; the hair and eyes are brown. The Ostiaks number some 20,000 and are reported to be a disappearing people, their only resources being hunting and fishing. The Ostiaks of the region of the Narym, etc., are merely Samoyeds. The mass of the Ostiaks dwell between Obdorsk and Surgut—the Tas Ostiaks beyond Surgut are of mixed race. The Voguls and Ostiaks of the eastern slope of the Urals, who both call themselves Manzi, are very closely related by language, mythological ideas (e.g., adoration of the bear), and social institutions. Some intermixture with the Russian immigrants into Western Siberia has taken place. Consult: Seebohm, *Siberia in Asia* (London, 1882); Patkanoff, *Die Irtysch-Ostjaker und ihre Volkspoesie* (St. Petersburg, 1897); Martin, *Sibirica* (Stockholm, 1897); Abercromby, *Prehistoric and Proto-Historic Finns, both Eastern and Western* (London, 1898). A collection of Ostiak folk poems has been published by J. Pápay (Budapest, 1905).

OS′TIA′RIUS (Lat., doorkeeper, sexton). The name of the lowest of the four minor orders in the Roman Catholic church. In this definite sense the earliest mention known of it occurs in a letter of Pope Cornelius of the year 251; it seems to have been included with the other minor orders by his predecessor, Pope Fabian (236–251). By the end of the sixth century the ordination of this office was symbolized by the bishop delivering to the candidate the keys of the church with the words, "So act as one that must give account to God for the things which these keys guard." The duties attached to the office are those which are now performed by the sacristan (q.v.).

OS′TIEN′SIS, Porta (Lat., gate of Ostia). A gate in the wall of Aurelian at Rome through which the Via Ostiensis, the road to Ostia (q.v.), passed. It dates from the time of Honorius and its threshold is 12 feet above the level of the time of Aurelian, on account of the accumulation of rubbish leveled by Honorius. The gate was thrown open to the Goths by the Isaurians in 549. It was walled off in 1407 by King Ladislas of Naples, but was reopened in 1410 and is now the Porta di San Paolo.

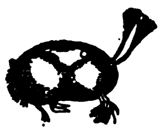
OSTIENSIS, Via (Lat., road of Ostia). An ancient road leading from Rome to Ostia (q.v.), on the left bank of the Tiber, and continued southward as the Via Severiana, joining the Via Appia at Terracina.

OSTINATO, ŏ′stê-nä′tō (It., stubborn). In music, a term applied to a constantly recurring short theme with constant changes in the other voices. Such themes are generally given to the bass, hence *basso ostinato*. It is a characteristic of the *chaconne* and *passacaglia* that they are always built upon such a *basso ostinato*.

OSTRACA. See Ostraka.

OS′TRACISM (Gk. *ὀστρακισμός*, *ostrakismos*, from *ὀστρακίζειν*, *ostrakizein*, to ostracize, from *ὄστρακον*, *ostrakon*, potsherd). A method of political procedure in ancient Greece, in Argos, Megara, Miletus, Syracuse, and especially Athens, whereby a citizen whose presence seemed dangerous to the state might be exiled for a time. It is said by Ælian to have been introduced at Athens by Clisthenes (q.v.) in his reform of the Athenian constitution after the expulsion of Hippias (510 B.C.), but the first use of it seems to have been made in 488–487 B.C., when Hipparchus, son of Charmus of Collytus, was exiled on account of his connection with the Pisistratidæ. Two others of this party followed, and in 485–484 B.C. Xanthippus, father of Pericles, was a victim, while a year or two later Aristides was banished. After the Persian wars the process was less frequently employed, though it was still used when party strife waxed hot and it seemed necessary to secure a definite verdict in favor of one policy. Among the ostracized were Themistocles, Cimon, Thucydides, son of Melesias, and Hyperbolus, whose exile really resulted in the abandonment of the system. The vote had been intended to decide between Nicias and Alcibiades, but they combined their forces against the much less influential Hyperbolus. Ostracism did not inflict any stigma upon a man, nor were his property or civil rights in any way disturbed. It simply required him to leave the country for 10 years in order that he might exercise no influence on the course of politics. It thus afforded a means of deciding between rival leaders and their policies, and insured to the victor an opportunity to carry out his plans undisturbed by violent opposition. Every year, in the sixth prytany, the assembly decided whether a vote of ostracism should be taken during the year. If the decision was affirmative a day was chosen in the eighth prytany, the market was fenced off, and through 10 gates the members of the 10 tribes entered to deposit the potsherds on which was written the name of the man whose ostracism was sought. To make the decision valid at least 6000 votes were required, but of these a plurality seems to have sufficed to ostracize. Besides the Histories of Greece by Grote, Curtius, Busolt, Holm, and E. Meyer, consult: Gilbert, *The Constitutional Antiquities of Athens and Sparta*, English translation (London, 1895); Hermann, *Lehrbuch der griechischen Antiquitäten*, i, "Staatsaltertümer," by Thumser (Freiburg, 1892); G. Busolt, *Die griechische Staats- und Rechtsaltertümer* (2d ed., Munich, 1892); and the article "Exsilium," in W. Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890).

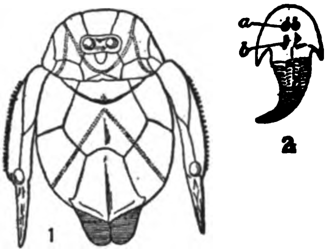
OS′TRACO′DA (Neo-Lat. nom. pl., from Gk. *ὀστρακώδης, ostrakōdēs*, like a potsherd, from *ὄστρακον, ostrakon*, potsherd + *εἶδος, eidos*, form). An order of crustacea in which the body is compressed and wholly protected by a bivalved shell or carapace. Besides the two sessile eyes and a median one, the former sometimes wanting, there are two pairs of antennæ, a pair of mandibles, two pairs of maxillæ, and two pairs of legs. The body is not divided into segments and the abdomen is rudimentary. The two valves are closed by a two-headed adductor muscle, the valves being joined together along the hinge margin by an elastic ligament. In swimming or in walking over the bottom the valves gape partly open, the slender legs protruding. Respiration is aided by a comblike bristly plate attached to the first pair of maxillæ, but there are no true gills. The young of the fresh-water Cypris hatches in a modified nauplius stage, but already inclosed in a thin shell covering the entire body. In the marine forms there is no metamorphosis, development being direct. Ostracods feed on animal matter; they abound in the fresh water, but the larger number are marine and exist at all depths. Many of the littoral as well as deep-sea forms are covered with thick shells more or less tuberculated, pitted, or otherwise ornamented. Fossil Ostracoda first appear in the Cambrian rocks. The order attained its maximum development in the Ordovician period, and in the Cretaceous modern forms began to appear. See CRUSTACEA; ENTOMIS.


AN OSTRACOD (*Cypris*).

OS′TRACODER′MI (Neo-Lat. nom. pl., from Gk. *ὀστρακόδερμος, ostrakodermos*, having a skin like a potsherd, from *ὄστρακον, ostrakon*, potsherd + *δέρμα, derma*, skin). A group of plectognath fishes which are without spines in the dorsal fin and have the body inclosed in an angular box, or carapace, formed by polygonal bony scutes firmly joined at their edges; they are the trunkfishes (q.v.).

Fossil Forms. Ostracodermi are the most primitive subclass of Paleozoic fossil fishes, characterized by the heavy calcareous plates that cover the head and forward part of the trunk and by the absence of the lower jaw. These primitive fishlike vertebrates are supposed to be the ancestral forms from which the higher groups of fishes and also all the other types of vertebrates have descended by evolution. They appear first in the Upper Silurian rocks of Europe and North America and they continue through to the top of the Devonian in both countries. The simplest forms are *Cyathaspis* and *Palæaspis*, found in the Upper Silurian and Devonian and *Pteraspis* of the Devonian. *Cephalaspis*, one of the best-known members of the group, has a horseshoe-shaped head shield and is found in the Silurian and Lower Devonian of Great Britain and in the Upper Devonian of eastern Canada.

The highest members of the subclass, represented by *Bothriolepis* and *Pterichthys*, have dermal skeletons of far more complex nature than those seen in the other members of the group. The heavy plates are more numerous and are symmetrically arranged, and attached to the sides of the head shield is a pair of finlike appendages, which are not, however, homologous to the fins of fish, though they closely resemble these latter. The hinder portion of the body was covered by small ganoid scales. Consult Woodward, *Outlines of Vertebrate Palæontology for Students of Zoölogy* (Cambridge, 1898), and Von Zittel and Eastman, *Text-Book of Palæontology*, vol. ii (New York, 1903). See CEPHALASPIS; CYATHASPIS; PTERASPIS; PTERICHTHYS.



OSTRACODERMI.

1, restoration of *Bothriolepis hydrophila* of the Old Red Sandstone; 2, *Auchenaspis egertoni*: *a*, orbits; *b*, post-orbital depression.

OSTRAKA, ŏs′trȧ-kȧ, or **OSTRACA** (from Gk. *ὄστρακα*, pl. of *ὄστρακον, ostrakon*, potsherd). Ostraka usually signifies those pieces of broken jugs and pots which were no longer regarded of value except as substances on which to write. Ostraka, although not unknown in Greece as writing material (compare, e.g., the Athenian OSTRACISM), were for that purpose mostly confined to Egypt, where they were so used as early as 2000 B.C. and as late as 800 A.D.; the greater part of extant ostraka, however, belongs to the period 300 B.C.–300 A.D. They consist of a great variety of subjects—private letters, educational notes, memoranda, accounts of business transactions, and receipts with ever the same recurring formulæ—and possess both a philological value (because they give us the vulgar or popular speech) and an historical value. Ostraka are written chiefly in Greek and Coptic; there are also extant Latin, Demotic, and a few Arabic and Aramaic ostraka. As the Egyptian soil was rich in clay strata and the climate was dry, such inscribed potsherds have been found in great numbers along the Nile valley and are now preserved in the museums of Cairo, London, Berlin, Paris, Leyden, Rome, Munich, Heidelberg, Turin, and others, also in private collections. Unfortunately those which have been removed to northern climates are rapidly becoming illegible. In ostraka, as in papyri, we find sometimes a recto and a verso, both the convex and the concave being inscribed, mostly, however, the former. For the vessels of antiquity which received their inscriptions or painting at the time they were manufactured see PAINTING; POTTERY.

Consult: U. Wilcken, *Griechische Ostraka aus Aegypten und Nubien* (2 vols., Leipzig, 1899); *Archiv für Papyrusforschung* (Leipzig, 1900 et seq.); W. E. Crum, *Catalogue of the Coptic Manuscripts in the British Museum* (London, 1905); V. Gardthausen, *Griechische Paläographie*, vol. i (2d ed., Leipzig, 1911).

OSTRAU, ŏs′trou. See MÄHRISCH-OSTRAU and POLNISCH-OSTRAU.

OS′TRICH (OF. *estruche*, *austruche*, Fr. *autruche*, Sp. *avestruz*, from Lat. *avis struthio*, ostrich bird, from *avis*, bird, and *struthio*, from Gk. *στρουθίων*, *strouthiōn*, ostrich, *στρουθιοκάμηλος*, *strouthiokamēlos*, ostrich, camel sparrow, so called from the long neck of the bird, from *στρουθός*, *strouthos*, bird, sparrow). The ostrich is the largest of living birds, long renowned for its beautiful plumes and its remarkable speed. Whether all ostriches belong to the same species was for many years an open question, but the differences between the three or four species which have been recognized appear to be constant. There is, however, only a single genus, *Struthio*, and a single family, the Struthionidæ. The relationship of this family to the rheas, emus, cassowaries, etc. (qq.v.), is still undecided, but all are members of the order Ratitæ, distinguished from all other living birds by the absence of any keel on the breastbone. (See RATITÆ.) Ostriches are natives of Africa and some parts at least of southwestern Asia. The common ostrich, or camel bird (*Struthio camelus*), is found on the dry open plains and deserts of northern and Central Africa (except Egypt), while the ostriches of southern Africa, Somaliland, and Asia have been described as distinct species. Fossil remains of the ostrich have been found in India.

The male is somewhat larger than the female, measures 7 feet, more or less, in height, and weighs upward of 200 pounds. His plumage is strikingly loose, fluffy, and deep black in color; only the plumes (quill feathers) of the wings and tail are white. The female is much less handsome (dull brownish gray), while the very young chicks are yellowish, marked with longitudinal streaks of blackish. The young male assumes his mature plumage in about three years. In the adult of both sexes the head and most of the neck are nearly bare, only a sparse down covering the skin. The feet and legs also are bare far up on the tibiæ. The bill is of moderate length, broad, flattened, and rounded at the tip, and with the nostrils opening considerably in front of the base. The ostrich is unique in several anatomical peculiarities: there are only two toes (the third and fourth), the outer of which is much smaller and frequently has no claw; there is a small external tail; and the pubic bones unite in a ventral symphysis. The wings bear three digits, on two of which are well-developed claws. The wing feathers are soft and are therefore useless for flight, though they assist greatly in running. The legs, however, are big and powerful and able to deliver a kick almost equal to that of a horse. The alimentary canal has a very muscular gizzard, as well as a large crop. There is no gall bladder. The food of the ostrich is chiefly vegetable, though small mammals, reptiles, and insects are sometimes taken. Water can be spared from the diet for long periods of time, if melons or other juicy fruits are available. Coarse gravel and small stones are swallowed to assist in the grinding work of the gizzard. In spite of an imperfect syrinx the ostrich has a loud voice, resembling the roar of the lion, though its most common sound is an angry hiss.

The ostrich is polygamous, one male consorting with from two to seven females. He scoops out a hollow in the sand, in which his companions lay their eggs, each female laying about 10. The eggs are not left to the heat of the sand and sun, as is often stated, but are incubated during the greater part of the day by one of the females and at night by the male. When the eggs are left during the heat of the day they are covered up with sand. The eggs are large and thick-shelled, of a creamy-yellow shade, with numerous small pits in the otherwise very smooth surface. Each egg is about 6 inches long and weighs nearly three pounds, while its cubic content approximates that of two dozen hen's eggs. The bird is extraordinarily keen-sighted and on its native plains is extremely wary. Hunting the ostrich has been a popular sport with the Arabs from time immemorial. They rely on the speed of their horses and run the birds down, a feat which would be impossible were it not for the curious fact that the ostrich runs in more or less of a circle, and the horsemen are thus able to continue the pursuit while traveling only a fraction of the distance that the bird runs. At full speed the ostrich is said to make 60 miles an hour, and for a limited time it can completely distance the fleetest horse.

Ostrich Farming. For many centuries ostriches have been partially tamed or domesticated on a small scale by some of the tribes of Central and northern Africa, but it is only since about 1860 that any extensive efforts have been made to supply the demand for ostrich plumes from domesticated birds. First in Cape Colony, later in Algeria and Argentina, and finally in the southwestern United States, ostrich farming was taken up as a profitable employment, and at the opening of the present century millions of dollars' worth of fine ostrich plumes were sent to market annually from ostrich farms. A consular report in 1899 stated that 261,000 ostriches were owned in Cape Colony alone. The farms of Arizona and southern California long since passed the experimental stage, and in addition there are now ostrich farms in Arkansas, Texas, Florida, and Pennsylvania. There are at present about 7000 ostriches in the United States. These birds are either pastured in small flocks or a cock and one or two hens are kept in areas inclosed with coarse wire-netting fences 6 or 7 feet high; these pastures are usually arranged in pairs, so that when the alfalfa, upon which the birds feed, is exhausted in one field, the birds may be driven into the other. They also receive grain. The birds rarely fall ill, and are quite prolific in captivity, a male and two females having been known to produce 188 eggs in a year, about 80 per cent of which yielded chicks. Artificial incubation is usually practiced, ordinary incubators with unusually large trays being used. When six or seven months old the birds undergo their first plucking, and thereafter at intervals of about seven months new crops of plumes may be gathered. The plumes are cut off, not pulled out, but after a few days the dead stumps are removed to make room for the new feathers. The price of the plumes varies very greatly with the quality, but each bird on a well-managed farm will yield from $20 to $50 worth at a plucking.

As the ostrich lives to be as much as 80 years old there is an opportunity for large profit from each one.

Consult: Mosenthal and Harting, *Ostriches and Ostrich Farming* (London, 1879); Annie Martin, *Home Life on an Ostrich Farm* (ib., 1891); C. W. Beebe, "The Ostriches and their Allies," in *Ninth Annual Report, New York Zoölogical Society* (New York, 1905); A. R. Lee, "The Ostrich Industry in the United States," in *Twenty-Sixth Annual Report of the Bureau of Animal Industry* (Washington, 1911); also Alfred Newton, *Dictionary of Birds* (New York, 1896), where many further references may be found.

OSTRICH FERN (*Onoclea*). A genus of ferns whose fertile fronds have somewhat the appearance of an ostrich plume and whose sterile ones attain a height of even 10 feet, the whole plant forming a beautiful vaselike cluster. There are two species (*Onoclea struthiopteris* and *Onoclea sensibilis*) known in America and Europe and there is probably another in Japan. The American species thrive best in northern latitudes in alluvial soil.

OSTROG, ŏs-trŏg′. A district town in the Government of Volhynia, Russia, about 90 miles west of Zhitomir (Map: Russia, C 4). It has a Gymnasium, a teachers' seminary, and ruins of an old castle. Leather is the chief product and there is some trade in grain, wool, and leather. Ostrog was formerly the residence town of a Polish principality of the same name, and is noted as the place where the first Bible in the Slavonic language was printed in 1581. The town came into the possession of Russia in 1795. Pop., 1897, 14,530; 1911, 19,948, largely Jewish.

OSTROGORSKI, ŏs′trô-gôr′skĭ, Moisei Ikovlevitch (1854–). A Russian political scientist. He was born at Grodno, Russia, was largely educated in France, where he lived for many years, but later returned to Russia, where he was a member of the first Russian Parliament or Duma. The first results of his study of American party government appeared in the *Annales des Sciences Politiques* in 1888–89. His monumental work on the British and American party systems was written in French under the title *La démocratie et l'organisation des partis politiques* (2 vols., 1903), but an English translation by Frederick Clarke, with a preface by James Bryce, had already appeared as *Democracy and the Organization of Political Parties* (2 vols., 1902; 2d ed., 1908). An abridged edition of the second volume appeared as *Democracy and the Party System in the United States* (1910). Ostrogorski is author also of *La femme au point de vue du droit public: Etude d'histoire et de législation comparée* (1892), crowned by the Faculty of Law of Paris and translated into English as *The Rights of Women: A Comparative Study in History and Legislation* (1893). It appeared in German also.

OSTROGOSH, ŏs-trô-gŏsh′. A town of south-central Russia, in the Government of Voronezh, situated 50 miles south of Voronezh. It has a high school and numerous churches, manufactures tobacco and soap, and carries on trade in cattle and agricultural products. Pop., 1897, 21,897; 1910, 15.067.

OS′TROGOTHS′. See Goths.

OSTROLENKA, ŏ′strô-lyĕn′kȧ. A district town in the Government of Lomzha, Russian Poland, situated on the Narev, 22 miles southwest of Lomzha (Map: Russia, B 4). Its chief industry is the manufacture of small articles from amber. The town is noted as the scene of two important battles. On Feb. 16, 1807, the Russians under Essen were defeated by the French under Savary, and during the uprising of 1830–31 the Poles were defeated by the Russians after a heroic struggle (May 26, 1831), in which the former lost some 9000 men. During the European War which broke out in 1914 Ostrolenka changed hands several times, being taken and retaken by both sides. See War in Europe. Pop., 1897, 8697; 1910, 15,985, chiefly Poles and Jews.

OSTROVSKI, ŏs-trôf′skĕ, Alexander Nikolayevitch (1823–86). A Russian dramatist. He was born in Moscow. The son of a lawyer, he accepted in 1845 a position in the Commercial Court, and to this is largely due his minute knowledge of mercantile scheming and fraud, which play such an important part in his comedies. After making his début with *Pictures of Family Happiness* in 1847, he attracted considerable attention by excerpts from his comedy *The Bankrupt, or We Can Settle with our own People*, and left his post for literature. The complete work produced a sensation and some 50 comedies followed. Yet, for many reasons, Ostrovski felt the pinch of need until shortly before his death, and, while idolized at Moscow, he found scant recognition at St. Petersburg. Just before his death he was appointed director of the Moscow theatres. The dream of his life—to be at the head of a school for dramatic acting—was realized, but the inordinate zeal with which he threw himself into the work wrecked his constitution. Among his plays the best are: *Do not Get into Somebody Else's Sled; Poverty is not a Fault; The Forest; A Profitable Position; The Innocent Culprits* (trans., New York, 1906); *The Storm* (1860). The last-named play, generally considered his masterpiece, was presented, in an English translation by Constance Storm, in New York (1900). His plays embrace all types of middle-class life. These he was able to draw with striking accuracy because of his perfect objectivity. Owing to his predilection for purely national characters and manners and his lavish use of proverbs and idiomatic expressions, Ostrovski is one of the writers most typically Russian. His works were published in 10 volumes, with a biography, by M. Pisarev (St. Petersburg, 1905) and by A. Nos (10th ed., Moscow, 1896–97). His translations (2 vols., St. Petersburg, 1886) are masterpieces of their kind, and especially noteworthy among them is Shakespeare's *The Taming of the Shrew.* Several plays of his have been translated into French by Durand Gréville. In English are available, besides *The Storm* and *Innocent Culprits*, two comedies translated by E. Voynich in *The Humor of Russia* (New York, 1895). Consult: the *Edinburgh Review*, vol. cxxviii (Edinburgh, 1868); J. Patouillet, *Ostrovski et son théâtre* (Paris, 1912), containing a bibliography; N. Kashin, *Etiudy ob Ostrovskom* (Moscow, 1912).

OSTROWO, ŏs-trō′vō. A town in the Province of Posen, Prussia, 50 miles northeast of Breslau (Map: Prussia, G 3). It is an important grain-trading centre and has saw mills, brickkilns, and breweries. Pop., 1900, 11,800; 1910, 14.770.

OSTUNI, ôs-tōō′nē. A city of south Italy, in the Province of Lecce, situated 19 miles northwest of Brindisi, on the Bari-Brindisi Railroad (Map: Italy, F 4). Towers of the old city wall are still to be seen. The city has a fifteenth-century cathedral and a library containing a collection of antiquities. Oil and lime are manufactured. Pop. (commune), 1901, 22,811; 1911, 23,354.

OSTWALD, ōst′vält, Hans Otto August (1873–). A German author. He was born in Berlin, was educated there in the public schools, became a goldsmith and worked at his craft till 1897. He first became known for his *Kleine Skizzen aus dem Berliner Volksleben* (1896), evidencing familiarity with the life of the common people. His works, mostly tales, sketches, and novels, show the influence of Gorky. Among these works may be mentioned: *Vagabunden* (1900); *Berliner Nachtbilder* (1903; 25th ed., 1908); *Walli und ihre Liebe* (1909); *Die Ballonfahrt* (1910); *Landstreichergeschichten* (1911). He became editor of *Discussion.*

OSTWALD, Wilhelm (1853–). A German chemist, born at Riga. He was educated at Dorpat, became a lecturer there in 1878, in 1882 was a professor in the Polytechnicum of Riga, and from 1887 to 1906 was professor of chemistry at Leipzig. In 1905–06 he visited the United States as exchange professor at Harvard. His original contributions to general physical chemistry and the subject of chemical affinity earned him international fame. His researches dealt particularly with the electric conductivity of organic acids, the parallel existing between the electrolytic dissociation of such acids and their power of chemical reaction, and the color of ions. In 1909 Ostwald received the Nobel prize for chemistry. Among his publications are: *Lehrbuch der allgemeinen Chemie* (2 vols., 1885–88; 2d ed., 1892–94); *Grundriss der allgemeinen Chemie* (1890; 3d ed., 1899); *Elektrochemie* (1895; 3d ed., 1905); *Vorlesungen über Naturphilosophie* (1902; 3d ed., 1905); *Conversations on Chemistry* (1905–06). In 1889 he undertook a collection of reprints of important scientific essays, called *Klassiker der exakten Wissenschaften,* of which about 200 volumes had appeared to 1915. In 1887 he established with van't Hoff at Leipzig the *Zeitschrift für physikalische Chemie* and in 1901 became editor there of the *Annalen der Naturphilosophie.* Consult E. E. Slosson, *Major Prophets of To-Day* (Boston, 1914).

OSUNA, ō-sōō′nä. A town of south Spain, in the Province of Seville, 48 miles east of Seville (Map: Spain, C 4). It is well built, with plazas and promenades, and contains a large Gothic collegiate church, founded in 1534. The chief manufactures are woolen textiles, soap, and hats. Pop., 1900, 17,826; 1910, 15,655. Osuna is the ancient Urso, later Orsona, a Roman garrison town. In the Civil War it is noted for its long and brave defense against the soldiers of Cæsar.

OSUNA, Conde de. See Moncada, Francisco de, Conde de Osuna.

OSUNA, Pedro Téllez-Girón, third Duke of (1579–1624). A Spanish general and statesman, seventh Count of Ureña, second Marquis of Peñafiel, and grandee of Spain of the first class. He was born at Valladolid and studied at Salamanca. Under Philip III, after brilliant service in Flanders, he was appointed Viceroy of Sicily in 1611 and of Naples in 1616. He opposed the establishment of the Inquisition at Naples and resisted the attempt of Venice to control the commerce of the Mediterranean. He was implicated in the conspiracy of Bedmar (q.v.) against Venice, and dispatched a fleet against that city in 1618, but met with defeat. He was recalled in 1620 on suspicion of planning to usurp the government of south Italy, was confined in the castle of Alameda, and later transferred to various other prisons, in one of which he died. Consult Gregorio Leti, *Vita di Don Pietro Giron, Duca d'Ossuna* (3 vols., Amsterdam, 1619); *Documentos inéditos para la historia de España,* vols. xxiii, xliv, xlv, xlvi, xlvii (Madrid, 1853 et seq.); Cesáreo Fernández-Duro, *El Gran Duque de Osuna y su marina* (Madrid, 1885).

OSWALD, Eleazer (1755–95). An American soldier and journalist. He was born in England. He became interested in the American Revolutionary cause and emigrated to America in 1770. In 1775 he served as captain under Arnold at Ticonderoga and at Quebec, where he assumed command and distinguished himself when Arnold was wounded. He was Arnold's secretary, and in 1777 was promoted to be lieutenant colonel in Lamb's artillery regiment. He became a printer and publisher at Philadelphia and later at New York. In all political questions he was a bitter opponent of Hamilton. In 1792 the French Revolution enlisted his sympathy and he commanded a regiment of artillery in the French army at the battle of Jemappes. After a fruitless secret mission to Ireland on behalf of the French government, he returned to New York, where he died of yellow fever, Sept. 30, 1795.

OSWALD, Richard (1705–84). A British diplomat. He was born in Scotland and after spending several years in America became a London merchant. He was chosen by Lord Shelburne as one of England's representatives at Paris in the negotiation of the treaty concluding the Revolutionary War. His generosity towards the Americans extended to a willingness to cede Canada to them. Oswald gave bail in the sum of £50,000 for Henry Laurens (q.v.).

OSWALD, Saint (c.605–642). King of the Northumbrians from 634 to 642. He was a son of Ethelfrid of Northumbria and on the death of the latter in 617 he spent some years in exile with the Scots in Iona, during which time he was converted to Christianity. Later he and his brothers drove out the Anglian invaders, and after his brother Eanfrid was treacherously slain by the British King Caedwalla in 634, he ascended the throne, after having defeated and slain his brother's murderer in battle. He married Cyneburh, a daughter of Cynegils, a West Saxon King, and with her assistance and that of St. Aidan (q.v.) introduced the Christian religion among the Anglo-Saxons. He was killed in a battle at Maserfelth against Penda, King of Mercia. For many years his bones were kept as sacred relics, and through them wonderful miracles were apparently wrought. His head is said to have been preserved at Durham until very recent years. Consult: C. W. C. Oman, *England before the Norman Conquest* (London, 1910); Alfred Plummer, *The Churches in Britain before A.D. 1000,* vol. i (ib., 1911); *Cambridge Medieval History,* vol. ii (New York, 1913).

OSWALDTWISTLE, -twĭs′l. A town and urban district in Lancashire, England, on the Leeds and Liverpool Canal, 3½ miles east-southeast of Blackburn. It has manufactures of cotton and print goods and chemicals; there are collieries, potteries, and stone quarries. It owns its gas and water works and abattoirs and maintains a technical school. Pop., 1901, 14,192; 1911, 15,714.

OSWALD VON WOLKENSTEIN, ōs′vȧlt fōn vōl′kėn-stīn (1367–1445). A German poet. He was born at Gröden of a noble Tyrolese family, and lived an eventful life, fighting from boyhood until he was past 50 in almost every country of Europe and in Persia and the Holy Land besides. The poetic manner of Oswald is sometimes strained and pedantic; and he is as much a predecessor of the Meistergesang as a follower of the Minnesingers. Some of his poems are religious and some are obscene. They were edited by Weber (1847); by Schatz and Koller in the *Denkmäler der Tonkunst in Oesterreich* (Vienna, 1902), with the music; and by Schatz (Göttingen, 1904). Consult Weber, *Oswald von Wolkenstein und Friedrich mit der leeren Tasche* (Innsbruck, 1850), and Zingerle's biography and critique (Vienna, 1870).

OSWE′GO. A city, port of entry, and the county seat of Oswego Co., N. Y., 35 miles by rail north by west of Syracuse; a terminus of the State Barge Canal, on Lake Ontario at the mouth of the Oswego River and on the New York, Ontario, and Western, the Delaware, Lackawanna, and Western, and the New York Central and Hudson River railroads (Map: New York, D 4). It is finely situated at a slight elevation above the lake and is laid out with regular and broad streets. Fine drives skirt both sides of the river and the shore of the lake. There are seven public parks. Oswego is the seat of a State normal and training school and has the Gerritt Smith Library, a city hospital, two orphan asylums, and a home for the homeless. Other prominent structures are the city hall, courthouse, customhouse, lighthouses, United States government building, and the State armory. A United States life-saving station is here, and the old French fort possesses a historic interest. Fort Ontario defends the harbor, which consists of an outer and an inner haven, protected by breakwaters and accessible for large steamers. There are three immense trestles that facilitate the extensive coal trade carried on by the port. Considerable quantities of grain and lumber also are handled. The foreign commerce of Oswego in 1913 consisted of exports valued at $3,945,198, and imports to the amount of $1,322,934. The city has excellent water power, promoted by five dams on the river near here, and is noted for its manufactures, which include starch, knit goods, shade cloth, car springs, boilers and engines, centrifugal pumps, paper-cutting machinery, tools, malt, yarn, matches, oil-well supplies, glucose, box shooks, underwear, automobile gears, etc. The census of 1909 returned an aggregate capital of $11,249,000 invested in the various industries, which had a production valued at $10,413,000. Under the charter of 1896 the government is vested in a mayor, elected biennially, and a common council. The members of the departments of fire and police are chosen by popular vote. Appointments to other important offices are controlled by the mayor. Oswego owns and operates the water works. Pop., 1900, 22,199; 1910, 23,368; 1915 (State census), 25,434.

Established as a military station and trading post about 1724, Oswego was incorporated as a village in 1828 and was chartered as a city in 1848. Owing to its location it was an exceedingly important post in King George's War and the French and Indian War. In 1755 Colonel Mercer built two strong forts here, and in August, 1756, General Montcalm attacked and captured the place and demolished the works, 30 men being killed or wounded on each side and 1700 English prisoners being taken. In 1759 Oswego was the centre of military operations in this part of the country and the point from which General Amherst with 10,000 men started to meet Wolfe at Quebec. In 1766 Pontiac here met Sir William Johnson and formally submitted to the English. On May 6, 1814, a strong English force captured the fort after a sharp engagement. Consult Churchill, Smith, and Child, *Landmarks of Oswego County* (Syracuse, N. Y., 1895).

OSWEGO BASS. A local name in New York State for the large-mouthed black bass.

OSWEGO TEA (*Monarda didyma*). An erect odorous herb of the family Labiatæ. It has bright-red, showy flowers, much visited by bees, for which it is often planted as a pasturage; hence the name bee balm.

OSWESTRY, ŏz′ĕs-trĭ. A municipal borough and market town in Shropshire, England, 18 miles northwest of Shrewsbury (Map: England, C 4). Its chief trade is agricultural; it has railway works and manufactures of machinery and agricultural implements, malt, and leather. Coal mines and limestone quarries are worked in the neighborhood. It owns its water works and markets, has installed a modern system of sewage disposal, and maintains a grammar school, a school of arts and sciences, a library, a gymnasium, and an isolation hospital. An early British town, it was the scene of frequent conflicts between Saxons and Welsh and Normans and Welsh. Oswald's Well and Old Oswestry, an early British encampment, are neighboring points of interest. Pop., 1901, 9579; 1911, 9991.

OSYMAN′DYAS (Lat., from Gk. *'Οσυμανδύας*). The name of a King of Egypt who, according to Greek writers, invaded Asia with a large army, greatly distinguished himself by his victories, and conquered the Bactrians, who had revolted from him. Diodorus describes a magnificent monument, the Osymandeion, erected by this monarch in the Theban necropolis near the tombs of the concubines of Ammon. The name Osymandyas is merely a corrupt Greek form of *User-ma' (t)-rê*, the prænomen of Ramses II, and there can be little doubt that the Osymandeion was in reality the Rameseum, built by Ramses on the western bank of the Nile at Thebes. Consult: Diodorus, i, 47–49; Tzetzes, *Chiliades*, iii, 892; iv, 620; Budge, *A History of Egypt*, vol. v, pp. 92 ff. and elsewhere (New York, 1902).

OTAHEITE, ō′tȧ-hē′tē. See TAHITI.

OTAL′GIA (Neo-Lat., from Gk. *ὠταλγία*, earache, from *οὖς*, *ous*, ear + *ἄλγος*, *algos*, pain). Neuralgia of the ear. The pain is noninflammatory and occurs in all degrees of severity. It may arise from disease of the nerves of the ear or may be transmitted to them reflexly from other sources. Decaying teeth are a fruitful source of otalgia; it is sometimes a symptom of ulcer or cancer of the tongue, rheumatism of the temporomaxillary joint, etc. When patients complain of earache the pain is far more commonly due to otitis media, or inflammation of the tympanic portion of the ear, a much more serious affection. See OTITIS MEDIA.

OTARI'IDÆ. See CARNIVORA; PINNIPEDIA.

OTARU, ō-tä'ry̤. The second seaport of Yezo, Japan, situated on the west coast of the island, 22 miles by rail west of Sapporo (Map: Japan, G 2). It is important principally on account of its herring fisheries, which give occupation to a large proportion of the inhabitants. Some flint implements of Aino origin are the only trace of the aborigines. Pop., 1908, 91,281.

O'TARY. See SEAL.

OTAVALO, ō'tȧ-vä'lō. A town of the Province of Imbabura, Ecuador, situated 26 miles north of Quito, in a narrow valley, at an elevation of 8422 feet above the sea. The town is well built and has some cotton and woolen mills. Agriculture and stock raising are carried on around the town. It was founded in 1534 and almost totally destroyed by an earthquake in 1868. Pop. (est.), 8600.

OTCHAKOV, ō-chä'kōf. A fortified seaport of South Russia, in the Government of Kherson, situated at the mouth of the Dnieper, 60 miles east of Odessa. Its harbor is much frequented by coasting vessels. It was formerly an important Turkish fort, the last remnants of which were blown up by the Russians in the Crimean War. The present fortifications are modern and command the entrance to the Dnieper. Pop., 1897, 10,784; 1911, 14,300.

OTEL'LO. An opera by Verdi (q.v.), first produced in Milan, Feb. 5, 1887; in the United States, April 16, 1888 (New York).

OTFRIED, ŏt'frēt (c.800–c.870). An Alsatian poet and theologian. As a student at the abbey of Saint-Gall he was a friend of Solomon, afterward Bishop of Constance; he then studied at Fulda under Rabanus Maurus. Next Otfried became priest and monk in the wealthy abbey of Weissenburg, where he acted as a notary (851). His fame is due wholly to his Frankish or Theodisc (Deutsch) poem on the Gospels, one of the great monuments of Old High German, written to replace the heathen songs which the Franks kept up because they did not understand Latin hymns. Called the *Liber Evangeliorum Domini Gratia Theodisce Conscriptus* (completed c.868), it begins with dedications to Louis the German and to Bishop Solomon in Frankish verses and to Liutbert, Archbishop of Mainz, in Latin prose. The poem (in five parts) contains about 15,000 verses. Grouping into strophes is possible. It is remarkable because it uses a kind of rude rhyme instead of the alliteration customary in Old Germanic poetry, and because it has a more nearly regular rhythm. Poetically it is inferior to the *Heliand*, a work of similar religious character, although it contains some passages of beauty. It is doubtful whether this poem ever accomplished Otfried's aim, yet for the philologist and the student of cultural history it is a work of great value. Of Otfried's other writings only fragments are left. The best manuscript of his *Liber Evangeliorum*, probably revised by the author, is at Vienna, the other two at Heidelberg and at Munich.

Bibliography. Piper, *Otfrieds Evangelienbuch* (Freiburg, 1884); especially Kelle's text (Regensburg, 1856–69) and glossary (ib., 1879–81); Erdmann's text (Halle, 1882–83), containing an excellent bibliography; translations by Rapp (Stuttgart, 1858), Rechenburg (Chemnitz, 1862), and Kelle (Prague, 1870); also: Lachmann, in his *Kleinere Schriften* (Berlin, 1876); Schütze, *Beiträge zur Poetik Otfrieds* (Kiel, 1887); Tesch, *Zur Entstehungsgeschichte des Evangelienbuches von Otfried* (Griefswald, 1890); A. E. Schönbach, in *Zeitschrift für deutsches Altertum*, vol. xxxviii, pp. 209, 336, vol. xxxix, p. 57, vol. xl, p. 103 (Leipzig, 1894–96); C. Pfeifferl, *Otfried im Gewande seiner Zeit* (Göttingen, 1905).

OTHEL'LO, THE MOOR OF VENICE. A tragedy by Shakespeare, written probably in 1604 and printed in quarto 1622 and in folio 1623. It was produced probably in 1605, and positively in 1610 according to the diary of the Prince of Württemberg's secretary. Shakespeare found the story in "Un capitano moro," one of the Italian novels in Cinthio's *Hecatommithi*, a collection published in 1565. A French translation appeared in 1584, but no English version was extant. The general plan of the Italian story was followed in the tragedy, but none of the names were used except a modified form of Desdemona. The history of Venice gives an account of one Moro, a Governor of Cyprus, whose wife died on the return voyage under mysterious circumstances, and this may be the historical basis of the tale. The title Moor means an Arab.

OTHMAN, ŏth-män' (Ar. *'Uthmān, ibn 'Affān*) (c.574–656). The third Caliph of the Moslems. He belonged to the family of the Prophet, and was cousin-german of Abu Sufyan. An early convert to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law, marrying first his daughter Rukaiya and after her death her younger sister, Umm Kulthum. He was elected to succeed Omar in the caliphate late in the year 644. The choice was not made without much unseemly strife, Othman's most formidable opponent being Ali. The worldly motives that entered into the policy of Othman soon brought on serious difficulties. The able and energetic leaders who had been appointed by Omar were superseded by members of Othman's own family and of that of Abu Sufyan. Egypt revolted, and the Caliph was compelled to reinstate Amr ibn al As (q.v.) in the government of that country, and several other rebellions were only quelled by a similar restoration of the previous governors. Zealous Moslems deplored the folly of their chief, and were indignant at seeing the chair of the Prophet occupied by Othman while Abu Bekr, and even Omar, were accustomed to seat themselves two steps below it. Emboldened by the knowledge of his vacillating and cowardly disposition, they showered upon him reproaches and menaces; the bearer of their remonstrances having been bastinadoed by Othman's order, a general revolt ensued. Othman averted the crisis by unconditional submission; but having soon after attempted to put to death Mohammed, the son of Abu Bekr, the latter made his appearance at Medina, at the head of a troop of malcontents and, forcing his way to the presence of Othman, stabbed him to the heart (656). It was under Othman that the second revision of the Koran was made and an authentic copy prepared which served as the standard and prototype. See CALIPH; MOHAMMEDANISM. Consult: Weil, *Geschichte der Chalifen* (Mannheim, 1846); Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1885); Sir William Muir, *Annals of the Early Caliphate* (London, 1883); id., *The Cal-*

iphate: Its Rise, Decline, and Fall (ib., 1891); C. I. Huart, *Histoire des Arabes* (Paris, 1912).

OTHMAN, or **OSMAN, I,** surnamed AL-GHAZI, i.e., the Conqueror (c.1259–1326). The founder of the Ottoman power. He was born in Bithynia; his father, Ertoghrul, was a Turkish chief. On the death of the latter, in 1288, his tribe chose his son Othman (i.e., the young bustard) as his successor. Othman conquered all the northwest of Asia Minor, Brusa being taken just before his death by his son Orkhan (1326). Many tales are told of his love-making, valor, and trickery. Othman held his court at Kara-Hissar and struck money in his own name; it is probable that he took the title of Sultan in 1299. From him are derived the terms Ottomans and Osmanlis, which are employed as synonymous with Turks. Consult: E. S. Creasy, *History of the Ottoman Turks* (New York, 1878); Halil Ganem, *Les sultans ottomans*, vol. i (Paris, 1901); Nicolaé Jorga, *Geschichte des osmanischen Reiches*, vol. i (Gotha, 1908).

OTHMAN II (1605–22). A Turkish Sultan, son of Achmet I. He succeeded his uncle, Mustapha I, in 1618, ruled with much energy, in spite of his youth, and made war on Sigismund III of Poland. Defeated at Khotin, the Sultan swore to take vengeance on the Janizaries (q.v.) for the miscarriage of his plans, but they revolted and he was killed. Consult Halil Ganem, *Les sultans ottomans*, vol. i (Paris, 1901), and Nicolaé Jorga, *Geschichte des osmanischen Reiches*, vol. iii (Gotha, 1910).

OTHO I, THE GREAT (912–973). The founder of the Holy Roman Empire of the German nation (*Heiliges römisches Reich der deutschen Nation*). He was the eldest son of Henry the Fowler, King of Germany, and was early recognized as the successor to the crown. In 936, on the death of his father, who left him the Duchy of Saxony, he was elected and crowned as King of the Germans, though his brother Henry, who had been born in the purple, was the favorite of many. Immediately upon the news of the death of King Henry the various conquered Slavic tribes arose, and amid these foreign wars civil strife soon raged, which centred around King Otho's brother Henry. Otho with the assistance of Hermann Billung repulsed the Slavs and Hungarians, leaving their total subjugation to a more favorable time. Meanwhile, however, Duke Eberhard of Franconia, feeling himself injured by Otho, conspired with Henry, the brother of Otho, Giselbert of Lorraine, and others, and was supported by Louis IV of France. But, though the danger for a long time was great, Otho finally triumphed; in 939 Eberhard and Giselbert were killed, and Henry, in 941, was pardoned by his brother. A new assignment of the duchies was thereupon carried out by Otho, who gave them to faithful relatives and devoted followers and bound them closer to the crown than they had ever been. Meanwhile Otho's fame had spread and he embraced the opportunity for interfering in Italian affairs when he was summoned by Queen Adelaide, the widow of King Lothair, to protect her from Berengar II. In 951 Otho answered the call, Berengar was defeated, and Adelaide became Otho's second wife. Berengar II was permitted by Otho to rule as his feudatory. But though Otho thus was master of northern Italy, he was unable to take Rome, which was held by Alberic II (q.v.), and in 952 he returned to Germany, where a rebellion, incited by Ludolf, son of his first wife, soon threatened to overturn his throne, especially as the Hungarians, taking advantage of the internal strife, invaded Germany in 954. But the rebels were finally overcome, and the Hungarians were decisively defeated in 955 in the battle on the Lechfeld, which ended their raids.

In 954 Alberic II died and his son Octavian became Pope as John XII. Against him Berengar took up arms, whereupon Otho sent his son Ludolf into Italy. Ludolf died in 957, and four years later the German King himself crossed the Alps for the second time and put an end to the rule of Berengar. The gates of Rome were opened to him, and in 962 he received from John XII the Imperial crown, thus founding the Holy Roman Empire of the German nation and establishing that close connection between Italy and Germany which formed so important a feature of mediæval history. Otho lost no time in asserting his Imperial prerogatives, and having called a council, effected the deposition of John, whose licentiousness had become a burden to Italy and a scandal to Christendom, and caused Leo VIII to be elected in his place. This resulted in renewed wars, in all of which Otho was victorious. In order to obtain control over the whole of Italy Otho sought the hand of a Greek Princess for his son and presumptive successor. An embassy to Constantinople in 968 failed, as we know from the account of one of the ambassadors, Liudprand (q.v.). But when John Zimisces (q.v.) became Emperor he favored the alliance and Otho II and Theophano were duly married. On May 7, 973, the great Emperor died, and was buried at Magdeburg, which he had made the seat of an archbishop. Otho had restored the prestige of the Imperial power, but it rested on no firm foundation. He was compelled, on account of the absence of a strong middle class, to depend on a party among the higher clergy and great nobles, who, under weaker successors, turned against the crown. Consult Ernst Dümmler, *Jahrbücher der deutschen Geschichte: Kaiser Otto der Grosse* (Leipzig, 1876), and Wilhelm von Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i (5th ed., Brunswick, 1881).

OTHO II (955–983). Holy Roman Emperor from 973 to 983. He was a son of Otho the Great, during whose lifetime (967) he had been crowned as Emperor. In 972 he was married to the Byzantine Princess Theophano. Soon after his accession rebellion broke out largely through the machinations of Henry II of Bavaria, who formed a secret alliance against the young Emperor; but Otho put down the rebellion in 977. The next scene of war was Lorraine, which the French King Lothair had seized as a former appanage of his crown; but here, after a partial defeat, Otho succeeded in reasserting his power in 978, and, not content with his advantage, devastated Champagne, pursued and captured Lothair, and advanced upon Paris, one of the suburbs of which he burned. Scarcely was this war ended when the disturbed condition of Italy called Otho across the Alps. His presence put a stop to the insurrection at Milan and Rome, where he reëstablished order; and, having advanced into lower Italy, he defeated the Saracens, drove back the Greeks, and after establishing his supremacy in Apulia and Calabria, which he claimed in right of his wife, Theophano, made himself master of Naples and Salerno, and finally of Taranto, in 982. The

Greek Emperor, alarmed at the successful ambition of Otho, called the Saracens again into Italy, who gave him battle with overwhelming numbers. The result was a total defeat of the Emperor near Cotrone. Otho himself narrowly escaped capture by the Saracens by plunging into the sea and getting on a Greek ship, where he was virtually a prisoner; but as the vessel neared Rossano, a friendly port, he contrived to escape. Otho now hastened to Verona, where a diet was held, which was numerously attended by the princes of Germany and Italy and at which his infant son Otho was recognized as his successor. Otho's death at Rome, Dec. 7, 983, arrested the execution of the preparations against the Greeks and Saracens, which had been planned at the Diet of Verona, and left the Empire embroiled in wars and internal disturbances. Consult Wilhelm von Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i (5th ed., Brunswick, 1881), and Karl Uhlirz, *Jahrbücher des deutschen Reiches unter Otto II. und Otto III.*, vol. i (Leipzig, 1902).

OTHO III (980-1002). Holy Roman Emperor from 983 to 1002. He was the son of Otho II and his wife, Theophano, and on his father's death, in 983, was crowned King of the Germans at Aix-la-Chapelle. From this time till 996, when he received the Imperial crown at Rome, the government was administered with extraordinary skill and discretion by three female relatives of the boy King, viz., his mother, Theophano, who died in 991; his grandmother, Adelaide; and his aunt, Matilda, abbess of Quedlinburg. The princes of the Imperial family disputed the right of these royal ladies to the custody of the young monarch. Henry of Bavaria, the nearest agnate, having seized the person of Otho, tried to usurp the supreme power; but, opposed by the majority of the other princes of the Empire, he was compelled to release him, in consideration of receiving back his forfeited duchy. Otho early showed that he had inherited the great qualities of his forefathers. In 996 he was crowned Emperor by his relative, Gregory V, whom he had raised to the papal throne, and, having settled the affairs of Italy, returned to Germany. The rebellion of Crescentius, who drove Gregory from the papal throne, compelled Otho to return to Italy, where success attended his measures. Crescentius, who had thrown himself into Sant' Angelo, was seized and beheaded, together with 12 of his chief adherents; the Antipope, John XVI, imprisoned; Gregory restored; and, on the speedy death of the latter, Otho's old tutor, Gerbert, Archbishop of Ravenna, raised to the papacy under the title of Sylvester II, as the first Pope of French nationality. (See SYLVESTER II.) Otho, elated with his success, took up his residence in Rome, where he organized the government, erected new buildings, and showed every disposition, notwithstanding the ill-concealed dissatisfaction of the Romans, to convert their city into the capital of the Western Empire. Together with Sylvester he dreamed of reëstablishing in full the old Roman Empire, but the insurrection of the Romans frustrated his plans and, escaping from the city at the risk of his life, he withdrew to Ravenna to await the arrival of reënforcements from Germany, but before they had crossed the Alps Otho died in 1002 at the age of 22. Consult: Wilhelm von Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i (5th ed., Brunswick, 1881), and Ferdinand Gregorovius, *History of the City of Rome*, vol. iii (Eng. trans., London, 1895).

OTHO IV (c.1175-1218). Holy Roman Emperor from 1198 to 1214. He was the son of Henry the Lion, Duke of Bavaria and Saxony, and Matilda, sister of Richard the Lion-hearted. His father was outlawed by Frederick Barbarossa in 1180 and in the following year was stripped of most of his dominions. Otho and his brother succeeded to a small fragment, the later Brunswick and Lüneburg. Otho was educated at the English court and participated in Richard's wars against Philip Augustus of France. In 1197 the Emperor Henry VI died, leaving an infant heir, Frederick II. A majority of the German princes offered the crown to Philip, Duke of Swabia, brother of Henry (1198), but the Guelphs set up Otho as rival King. A civil war resulted, and by 1206 Otho was apparently defeated, but Philip was assassinated in 1208 by Otho of Wittelsbach. Otho of Brunswick was recognized by Innocent III, who crowned him Holy Roman Emperor at Rome in 1209. In 1210 Otho was excommunicated by the Pope because he had seized some papal territory, and in 1211 some of the German princes declared Otho deposed, in favor of Frederick II, King of Sicily and Naples. After an unsuccessful struggle, and after the defeat at Bouvines (q.v.) by Philip Augustus in 1214, Otho withdrew to his estates in Brunswick, where he passed the last part of his life in penitential exercises. He died May 10, 1218. Consult Gustav Langerfeldt, *Kaiser Otto IV.* (Hanover, 1872), and Eduard Winkelmann, *Philip von Schwaben und Otto IV. von Braunschweig* (2 vols., Leipzig, 1873-78).

OTHO, MARCUS SALVIUS (32-69). Emperor of Rome from Jan. 15 to April 17, 69 A.D. He was descended from an ancient Etruscan family. He was a favorite companion of Nero, who appointed him Governor of Lusitania, in which office he acquitted himself creditably. On the revolt of Galba against Nero (68) Otho joined the former, but, disappointed in his hope of being proclaimed Galba's successor, he marched at the head of a small band of soldiers to the Forum, where he was proclaimed Emperor, and Galba was slain. Otho was recognized as Emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius. The first few weeks of his reign were marked by an indulgence towards his personal enemies and a devotion to business which, though at total variance with his usual habits, excited in the minds of his subjects the most favorable hopes. But the rebellion raised in Germany by Valens and Cæcina during the reign of Galba had by this time gathered strength and, these commanders having prevailed upon Vitellius to join his forces to theirs, the combined army poured into Italy. Otho possessed several able generals, who repeatedly defeated the rebels; but the prudence of some among them in restraining the enthusiasm of their troops, who wished to follow up their victories, was considered as cowardice or treason and produced dissensions in Otho's camp. This state of matters, becoming known to the generals of Vitellius, encouraged them to unite their armies and fall upon the forces of Otho. An obstinate engagement took place near the junction of the Adda and the Po, in which the army of Otho was completely routed, and the survivors went over on the following day to the side of the victor. Otho, though by no means reduced to extremity, resolved to make no further resistance, settled his affairs with the utmost deliberation, and stabbed himself. Consult: Tacitus, *Historiæ*, i, 12–50, 71–90, ii, 11–51, and the accounts of Otho's life by Plutarch and Suetonius; L. Paul, "Kaiser M. Salvius Otho," in *Rheinisches Museum*, vol. lvii (Bonn, 1902); B. W. Henderson, *Civil War and Rebellion in the Roman Empire, 69–70* A.D. (Cambridge, 1908).

OTHO OF BAMBERG, bäm'bĕrk, SAINT (c.1069–1139). Apostle to the Pomeranians. He was born in the County of Bregenz, a member of the noble family of Mistelbach in Swabia. Ordained a priest, he became court chaplain to the Polish Duke Ladislas Hermann, and through his diplomatic duties made the acquaintance of the Emperor Henry IV, who made him his Chancellor and in 1102 appointed him Bishop of Bamberg. He introduced Christianity into Pomerania and was canonized in 1189. Consult Johannes Looshorn, *Der heilige Bischof Otho* (Munich, 1888), and Georg Juritsch, *Geschichte des Bischofs Otto I. vom Bamberg* (Gotha, 1889).

OTHO OF FREISING, frī'zĭng (c.1111–58). The greatest of the German chroniclers of the Middle Ages. He was a half brother of the Emperor Conrad and an uncle of the Emperor Frederick Barbarossa. He was educated at Paris, and, attracted by the ascetic life of the Cistercians, entered their monastery at Morimond in 1133. About three years later he was elected abbot and in 1137 became also Bishop of Freising. He always labored hard for his diocese, but also participated in the politics of his day. He joined the Second Crusade, led by Conrad III of Germany, and had command of one division. Between 1143 and 1146 he wrote his *Chronica*, and later the *Gesta Friderici Imperatoris*, but died before the work was finished. His works were edited by Roger Wilmans in the *Monumenta Germaniæ Historica, Scriptores*, vol. xx (Hanover, 1868); the most recent editions (Hanover, 1912) are edited by Adolfus Hofmeister (the *Chronicle*) and George Waitz (the *Gesta*); there is a German translation by Horst Kohl in *Geschichtsschreiber der deutschen Vorzeit, XII. Jahrhundert*, vol. ix (Leipzig, 1894). Consult: Justus Hashagen, *Otto von Freising* (Leipzig, 1900); Joseph Schmidten, *Die geschichtsphilosophische und kirchenpolitische Weltanschauung Ottos von Freising* (Freiburg, 1906); also August Potthart, *Bibliotheca Historica Medii Ævi*, vol. ii (Berlin, 1896), for the older works about Otho.

OTHO OF NORDHEIM, nōrt'hīm (?–1083). A German noble who played an active rôle in the reign of Henry IV. Otho was descended from an old Saxon family whose seat was near Göttingen. In 1061 Agnes of Poitiers, who was Regent during the minority of her son, Henry IV, gave the vacant Duchy of Bavaria to Otho, in order to gain his aid against the powerful interests arrayed against her. But Otho deserted her and united with the powerful prelates to bring about her downfall. The conspirators obtained possession in 1062 of the young ruler and deposed the Empress from the regency. Henry IV never forgave this deed. When the young King assumed the government in person Otho was one of the most powerful of the nobles, and his downfall appeared necessary in order to permit the development of the Imperial power. In 1070 Otho was suddenly charged with planning a conspiracy in order to make himself King. Probably the accusation was false, but Otho was found guilty, deprived of his duchy, and compelled to submit to Henry. He never gave up, however, his attempts to recover his territories, and hence was involved in and led the numerous uprisings of the Saxons against Henry IV. In 1077 Otho helped to elect Rudolph of Swabia as German King in opposition to Henry, and when Rudolph fell in battle, in 1080, he supported Hermann of Luxemburg, though he had hoped to obtain the election himself. Otho is important because he is typical of the class of great German nobles, who were ever ready to oppose any attempt on the part of the emperors to strengthen their government. Consult Adolf Vogeler, *Otto von Nordheim* (Minden, 1880), and Wilhelm von Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii (5th ed., Leipzig, 1890).

O'TIC GANGLION (from Gk. *ὠτικός, ōtikos*, relating to the ear, from *οὖς, ous*, ear). One of the four cranial sympathetic ganglia, the other three being Meckel's (q.v.), the ophthalmic (q.v.), and the submaxillary (q.v.). The otic, or Arnold's, ganglion is a small oval, flattened mass, of reddish-gray color, situated immediately below the foramen ovale. It is connected with the inferior maxillary branch of the fifth nerve and with the glossopharyngeal and the facial nerves. See NERVOUS SYSTEM AND BRAIN.

O'TIS, BASS (1784–1861). An American portrait painter, born in New England. He started as a scythe maker, was self-taught in art, and at first painted portraits in New York City. Afterward, in 1812, he settled in Philadelphia. His "Interior of a Smithy" (1819) in the Pennsylvania Academy is his only known genre picture. Most of his work was portraiture, and this includes President Jefferson, engraved for Delaplaine's *Portrait Gallery;* Alexander Lawson; the painter Jarvis; himself; and Dr. Philip S. Physick, of which he made a crude aquatint. He also tried mezzotinting and various other processes, and produced the first lithograph in America.

OTIS, ELWELL STEPHEN (1838–1909). An American soldier. He was born at Frederick, Md., but early removed with his family to a farm near Rochester, N. Y., and graduated at the University of Rochester in 1858. Three years later he graduated at the Harvard Law School and then opened an office in Rochester; but in 1862 he entered the military service of the Federal government as a captain in the 140th New York Volunteers and served with them throughout the Civil War, rising to the rank of lieutenant colonel. He participated in many of the battles of the Army of the Potomac, including Gettysburg and the Wilderness, and was mustered out in 1865 with the brevet rank of brigadier general of volunteers. The next year he was appointed lieutenant colonel of the Twenty-second Infantry in the regular army, and by successive promotions became colonel in 1880, brigadier general in 1893, major general of volunteers in 1898, and major general in the regular army in 1900. In 1898 he was sent to the Philippines, where he relieved Major General Wesley Merritt as commander of the United States forces and military governor of the islands, and in February, 1899, he was brevetted major general in the regular army for "military skill and most distinguished services in the Philippines." He was a member of the first Philippines commission in 1899. In 1900 he was recalled to the United States and assigned to the command of the Department of the Lakes, and in March, 1902, was retired from the service.

OTIS, Fessenden Nott (1825–1900). An American surgeon, born at Ballston Spa, N. Y. He was educated at Union College and at the New York Medical College and the College of Physicians and Surgeons (M.D., 1852). In the latter institution he was lecturer on genito-urinary diseases (1862–71) and then clinical professor of that subject. He invented many surgical instruments, of which the more important are an urethrometer, a dilating urethrotome, and an evacuator for use after lithotrity. Ill health compelled him to retire and abandon active practice during the last few years of his life. He died in New Orleans. His works include many monographs on his especial branch, including *Stricture of the Male Urethra: Its Radical Cure* (1878; 2d ed., 1880); *Clinical Lectures on the Physiological Pathology and Treatment of Syphilis* (1881); *Practical Clinical Lessons on Syphilis and the Genito-Urinary Diseases* (1883).

OTIS, George Alexander (1830–81). An American military surgeon, born in Boston, Mass. He graduated at Princeton in 1849 and in medicine at the University of Pennsylvania in 1851. After a short stay in Paris he settled in Richmond, Va., but soon removed to Springfield, Mass. In September, 1861, he was appointed surgeon of the Twenty-seventh Massachusetts Volunteers. With them he served until 1864, when he was appointed surgeon of United States Volunteers and was assigned to duty as curator of the Army Medical Museum and custodian of the Division of Surgical Records at Washington. On the conclusion of peace he accepted an appointment as assistant surgeon in the medical corps and continued his duties at the museum, which, owing to his zeal and energy, came to possess the most valuable surgical and anatomical collections in the world. He compiled with others the surgical volumes of the *Medical and Surgical History of the War* (1870–88), contributed frequently to medical publications, and for three years edited the *Virginia Medical and Surgical Journal*, later the *Stethoscope*, combining both under the title *Richmond Medical Journal*. Among his writings are *Amputation of the Hip-Joint in Military Surgery* (1867) and *Excision of the Head of the Femur for Gunshot Injury* (1869).

OTIS, Harrison Gray (1765–1848). An American lawyer and statesman. He was born in Boston, graduated at Harvard in 1783, was admitted to the bar three years later, and soon became one of Boston's most eloquent orators. In 1796 he was elected to the State Legislature and the next year was sent to Congress as a member of the party of Federalists (q.v.). After the expiration of his term he was chosen to fill a number of State offices and became one of the most popular public men in Massachusetts. His popularity was greatly diminished, however, by the active part he took in the Hartford Convention (q.v.), though he was afterward elected United States Senator (1817) and mayor of Boston (1829). His brilliant oratorical powers made him a leader in the Senate, where he opposed the further extension of slavery. Criticism of the Hartford Convention led him to publish a series of *Letters in Defense of the Hartford Convention and the People of Massachusetts* (Boston, 1824). Consult J. S. Loring, *The Hundred Boston Orators* (Boston, 1854).

OTIS, Harrison Gray (1837–). An American newspaper owner and soldier, born near Marietta, Ohio. He enlisted as a private in the Twelfth Ohio Infantry in 1861, served throughout the Civil War, and was brevetted lieutenant colonel in 1865. Appointed brigadier general of volunteers when the Spanish-American War broke out in 1898, he led his brigade in the capture of Caloocan in the Philippine Islands, and for this received the brevet of major general in 1899. Otis entered journalism in 1876 as editor and general manager of the Los Angeles *Times*, a newspaper that under his direction became widely known for its bitter and unrelenting opposition to union labor. In revenge a group of union labor men formed a conspiracy and in 1910 dynamited the *Times* plant, destroying the building and killing 21 employees. The McNamara brothers confessed their share in the crime in 1911. For history of the case, consult articles on California and Trade Unions in the New International Year Book for 1911.

OTIS, James (1725–83). An American statesman of the Revolutionary period. He was born, Feb. 5, 1725, at West Barnstable, Mass., graduated at Harvard in 1743, and studied law in the office of Jeremiah Gridley. He practiced for two years at Plymouth, but settled in 1748 in Boston, where he soon rose to the front rank in his profession. In 1761, when he was Advocate General, application was made to the Massachusetts Supreme Court for writs of assistance, i.e., general search warrants for the discovery of smuggled goods imported into the Colony. Otis was convinced of the illegality of these writs, and resigned his office rather than argue in their defense. He was immediately engaged to argue against them, which he did in a speech of great force and eloquence. It was of this speech that John Adams said, "American independence was then and there born." The judges reserved their decision, but no more writs were enforced, though some were issued. The resignation of Otis and his plea in behalf of the popular side of the writs-of-assistance controversy gave him a high reputation for patriotism, ability, and eloquence, which he more than maintained in the Legislature, to which he was elected the same year. Taking an active part in the legislative discussions upon taxation and representation, he became still more conspicuous by publishing in the following year, 1762, his *Vindication of the Conduct of the House of Representatives*, which has been considered one of the sources from which all the arguments against parliamentary taxation were later drawn and the basis of all subsequent treatises on free speech in America and France. This was followed, in 1764, by his *Rights of the British Colonies Asserted and Proved.* His apparent recognition of parliamentary supremacy in this pamphlet, however, served to qualify the regard in which he had been held by the extremists. In a third pamphlet, entitled *Considerations on Behalf of the Colonists,* published the following year, he reëstablished himself in the esteem of the radicals. On June 6, 1765, he made a motion, which was carried, that a congress of representatives from the various Colonies should be convened. In pursuance of this measure a circular letter was sent inviting the Colonies to join in a congress, and the Stamp Act Congress, which met in New York in the fall of 1765, was the result. Otis took part in the proceedings of this body and served on the committee which framed an address to the House of Commons. He was chosen Speaker of the Massachusetts General Court in 1766, but the Governor interposed his negative then, as also in the following years. In 1768, after the passage through Parliament of Charles Townshend's bill for the taxation of the Colonies, the Massachusetts General Court sent a second circular letter to the other Colonies calling on them to join in some common plan for protection. It was in answer to the message of Bernard, the Royal Governor, demanding that the circular be recalled, that Otis made a notable speech, condemned by the partisans of the crown as "the most violent, insolent, abusive, and treasonable declaration that perhaps was ever delivered." Only 17 members voted to recall the circular. In 1769 the customs commissioners accused him in England of treason. This coming to his notice, he publicly denounced the commissioners in the Boston *Gazette.* Meeting Robinson, one of the commissioners, in a coffee room the next night, he became involved in a dispute with him. An affray resulted, in which Otis received a cut on the head, which is supposed to have been the cause of his subsequent insanity. He sued Robinson, and recovered £2000 damages, but relinquished this sum in consideration of a written apology from Robinson. After a short residence in the country for the benefit of his health he returned to the Legislature in 1771. He was insane for the greater part of his subsequent life, with the exception of a short interval, when he went back to Boston and resumed the practice of his profession. The last two years of his life were spent at Andover, where he was killed by lightning, May 23, 1783. He published in 1760 a treatise on *The Rudiments of Latin Prosody; with a Dissertation on Letters and the Principles of Harmony in Poetic and Prosaic Composition.* Of his public career the elder Adams said: "I never knew a man whose love for his country was so sincere; never one who suffered so much; never one whose services for any 10 years of his life were so important or so essential to the cause of his country as those of Mr. Otis from 1760 to 1770." Consult his *Life* by William Tudor (Boston, 1823) and by Francis Bowen (ib., 1847); also M. C. Tyler, *Literary History of the American Revolution* (New York, 1897).

OTI'TIS ME'DIA (Neo-Lat., inflammation of the middle ear). An inflammation of the structures of the tympanic cavity of the ear. It may be acute or chronic. There is an effusion of fluid into the middle ear, which may be serous (the catarrhal form) or this may become infected with pus-producing organisms (the purulent form). It arises from exposure to cold or wet, the introduction of fluids into the middle ear through the Eustachian tube while bathing, or through douching the nose, or by extension of inflammatory processes from the nose and throat. It often begins in this way during the course of the infectious fevers, particularly in scarlatina, when it is of the purulent type. The symptoms of the acute form are sudden and intense pain in the ear, increased by coughing, sneezing, or swallowing, tinnitus aurium, or singing or buzzing noises heard by the patient, and more or less deafness. If the disease goes on unchecked suppuration takes place and the membrane of the tympanum, unless it is opened by the surgeon, perforates spontaneously and allows of the discharge of pus. Inflammation of the dura mater and abscesses in the brain may result, or the labyrinth (q.v.) may be invaded. The chronic form of the disease may be catarrhal (without suppuration) or purulent; in the latter there is a persistent discharge (see OTORRHŒA) of pus from the external ear. The catarrhal form often comes on insidiously and results in complete or partial deafness in the ear affected, unless arrested by treatment. The utmost skill is demanded in the treatment of acute otitis media in order to prevent its most usual complication, mastoiditis. See EAR, *Diseases.*

OTO, ŏ'tô. A small tribe of Siouan stock formerly holding the territory west of the Missouri and south of the Platte, in southeastern Nebraska, and now residing, together with the Missouri, upon a reservation in eastern Oklahoma. The two tribes speak the same language and have been confederated since the early part of the nineteenth century. The Oto now number 332.

OTOCYON, ô-tŏs'ĭ-ŏn (Neo-Lat., from Gk. *οὖς, ous,* ear + *κύων, kyōn,* dog). A genus of wild dogs, which differs from other genera of Canidæ primarily in having an additional molar in each jaw and other peculiarities of dentition. The genus contains only one species, *Otocyon megalotis* of Africa. See LALANDES FOX DOG; and Plate of FOXES AND JACKALS.

OTOMACO, ŏ'tô-mä'kô. A savage tribe, apparently constituting a distinct linguistic stock, living in the forests of the Orinoco, about the junction of the Meta, in central Venezuela. They are in a very low state of culture, but are monogamous and allow their women an equality in tribal ceremonies. They are addicted to the eating of a certain oily clay. Consult Tavera-Acosta, *En el Sur* (Ciudad Bolívar, 1907), and A. F. Chamberlain, in *Journal de la Société des Américanistes de Paris,* N. S., vol. vii (Paris, 1910).

OTOMI, ô-tŏ'mê (Nahuatl *otomitl,* wanderer). An ancient people of central Mexico, antedating the coming of the Aztec, by whom they were subjugated. They call themselves *Hia-hui,* and their tribes, constituting a distinct linguistic stock, occupied most of Querétaro and Guanajuato, with considerable portions of Hidalgo, Michoacán, and Mexico state. They are rather below medium stature and darker in color than the neighboring tribes, but appear to have been fully up to the standard in intelligence, living by agriculture, wearing cotton clothing of their own weaving, skillful in the working of gold, copper, and stone, and noted for their songs and musical ability and their religious ceremonials. They defeated several Spanish expeditions against them and were not finally reduced to submission until 1715. They still form a considerable and valuable portion of the population of the states named, and retain their own language, which, by reason of its monosyllabic character and peculiar sounds, was at one time erroneously thought to be connected with the Chinese.

OTÓN, ô-tŏn'. A town of Panay, Philippines, in the Province of Iloilo, situated at the mouth of a river, on the south coast, 6 miles west of Iloilo. Pop., 1903, 14,464.

OT'ORRHŒ'A (Neo-Lat., from Gk. *οὖς, ous,* ear + *ῥοία, rhoia,* a flow, from *ῥεῖν, rhein,* to flow). A purulent or mucopurulent discharge from the external ear. It may be acute or chronic, and, while it may be due to an abscess in the canal, it is, as a rule, an evidence of otitis media (q.v.). The treatment is that of the inflammation of the middle ear, which causes it. See Ear, *Diseases*.

OTRANTO, ō-trän′tō (Lat. *Hydruntum*). A town on the southeast coast of Italy, in the Province of Lecce, 24 miles southeast of Lecce by rail (Map: Italy, G 4). It has a cathedral with a fine mosaic floor, an eighth-century church, a castle, and is the seat of an archbishop. The chief industries are fishing and the manufacture of fishing nets and oil. During the Middle Ages it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece. It was destroyed by the Turks in 1480. Pop. (commune), 1901, 2401; 1911, 2771.

OTRANTO, Duke of. See Fouché, Joseph.

OTRANTO, Strait of. The passage connecting the Adriatic with the Ionian Sea (Map: Europe, E 4). It is a constriction of the large arm of the Mediterranean which separates the Italian from the Balkan Peninsula, and has a minimum width of 45 miles between the town of Otranto in Italy and Cape Linguetta in Turkey.

OTRANTO, The Castle of. A novel by Horace Walpole. See Castle of Otranto.

O'TRIG'GER, Sir Lucius. In Sheridan's *Rivals*, an Irish fortune hunter, honest and always ready for an opportunity to fight.

OTSE'GO. A village in Allegan Co., Mich., 43 miles south of Grand Rapids, on the Kalamazoo River and on the New York Central Railroad (Map: Michigan, D 6). Its chief industries are the manufacture of shoes and of paper. The water works are owned by the village. Pop., 1900, 2073; 1910, 2812.

OTSEGO BASS. A landlocked variety of the common whitefish (q.v.), found in Otsego Lake, at the head of the Susquehanna River.

OTSEGO LAKE. A small lake in Otsego County, central New York (Map: New York, F 5). It is the main source of the Susquehanna River. Cooperstown lies at its south end.

OTTAVA RIMA, ŏt-tä′vȧ rē′mȧ (It., octuple rhyme). The name given by the Italians to a stanza, composed of eight five-foot lines, rhyming ab ab ab cc. This stanza has been employed by English poets, notably by Fairfax in his translation of Tasso's *Jerusalem Delivered*, by Spenser in *Muiopotmos*, and by Byron in *Don Juan*. It is also the basis of two well-known English verse schemes. The seven-line stanza (ab ab b cc) called rhyme royal, which was employed by Chaucer and his followers and was revived by later poets, as William Morris, is the *ottava rima* with the fifth line dropped out. The so-called Spenserian stanza—that of the *Faerie Queene*—is also a modification of the *ottava rima*. Consult R. M. Alden, *English Verse* (New York, 1903).

OTTAWA, ŏt′ȧ-wȧ. A city of eastern Ontario, Canada, the capital of the Dominion and the county town of Carleton County, on the right, or south, bank of the Ottawa River at the confluence of the Rideau, and on the Canadian Pacific, the Canadian Northern, the Grand Trunk, and the Ottawa and New York railroads, 116 miles by rail west of Montreal (Map: Ontario, K 3). It communicates by steamer on the Ottawa with Montreal, and by the Rideau Canal with Lake Ontario at Kingston. At the west end of the city the Ottawa rushes over the magnificent cataract known as the Chaudière Falls, and at the northeast end, divided by Green Island, there are two other cataracts, over which the Rideau falls into the Ottawa. The scenery around Ottawa is scarcely surpassed by any in Canada. The immense water power is utilized for foundries, match, carbide, and other factories, flour mills, and for several saw mills, which give Ottawa its principal trade in enormous quantities of sawed timber. A railway bridge and a road bridge which has supplanted the suspension bridge over the Chaudière Falls connect Ottawa with Hull (q.v.), in the Province of Quebec. Four bridges span the Rideau River. The Rideau Canal divides the city into the Upper Town, or western portion, and the Lower Town, or eastern portion, the former being distinguished by its predominantly English and the latter by its predominantly French population.

Ottawa's streets are wide and laid out at right angles. Among its chief features are the Parliament and departmental buildings on Parliament Hill, 125 feet above the river, magnificent structures of Canadian and New York sandstone covering nearly four acres. They form three sides of a quadrangle, the south front of which is the Parliament building, nearly 500 feet long. The style of architecture is the Italian Gothic. Other buildings include the Basilica or Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, the city hall, post office, Rideau Hall, the Governor-General's residence, the Grand Trunk Railway station, the Château Laurier, a magnificent hotel built in the style of a French château, the Royal Observatory, Royal Mint, Dominion Archives Building, Agricultural and Industrial Exhibition Building, Ashbury College, numerous churches, the Ottawa Roman Catholic University, the Coligny Ladies' College, La Salle Academy, Carnegie Public Library, a collegiate institute and normal school, and several charitable and benevolent institutions. The Parliamentary Library contains over 200,000 volumes, and there are also the National Victoria Museum and a national art gallery. The Dominion Fisheries Exhibit and the Central Canadian Experimental Farm of 460 acres are interesting features. There are several fine parks, linked into a system by 30 miles of beautiful driveway surrounding the city. There are also water, gas, and electric-lighting plants, electric street railroads, and a modern system of sewerage. Many attractive places of resort are in the district surrounding the city, with all kinds of summer and winter sports. Ottawa is the residence of the Governor-General of Canada, the seat of a United States consul general, and the seat of the Roman Catholic Archbishop of Ottawa and of the Anglican Bishop of Ottawa.

There are about 180 manufactories, with an output of wood products, paper, matches, cement, carbide, marine gas buoys, iron and foundry products, mica, and clothing. In 1910 the value of the manufactured output was $20,924,331, as compared with $7,638,688 in 1900, being an increase of 173.92 per cent. Ottawa was founded in 1827 by Colonel By, for whom it was named Bytown; was incorporated as a city under its present name in 1854; and was selected by Queen Victoria as the capital of Canada in 1858. Pop., 1901, 59,928; 1911, 87,062; 1915 (local est.), with suburbs, 134,500.

OTTAWA. A city and the county seat of La Salle Co., Ill., 82 miles by rail southwest of

Chicago, at the junction of the Fox and Illinois rivers, on the Illinois and Michigan Canal and on the Chicago, Rock Island, and Pacific, the Chicago, Ottawa, and Peoria, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, G 3). It is the seat of Pleasant View College (Lutheran) and of St. Francis Xavier Academy. It has a fine high school, Illinois Appellate Court, Odd Fellows' and Reddick's public libraries, the Ryburn Memorial Hospital, and Washington, Shabbana, Ellis, and Allen parks. Ottawa controls important commercial interests and possesses valuable natural advantages in deposits of coal, clay, and glass sand. Its extensive manufactures include glassware, chimney glass, pottery, fire brick, tile, sewer pipe, organs, pianos, carriages, wagons, buggies, agricultural implements, collars and harness, etc. Ottawa has adopted the commission form of government. The municipality owns and operates the water works. Ottawa was incorporated as a town in 1837. Pop., 1900, 10,588; 1910, 9535; 1915 (local est.), 11,121.

OTTAWA. A city and the county seat of Franklin Co., Kans., 58 miles by rail southwest of Kansas City, on the Marais des Cygnes River and on the Atchison, Topeka, and Santa Fe and the Missouri Pacific railroads (Map: Kansas, G 5). It is the seat of Ottawa University (Baptist), organized in 1865, and has a Carnegie library, Forest Park, and, among prominent buildings, the county courthouse, city hall, two hospitals, the Federal building, and Rohrbaugh Theatre. The city controls important commercial interests in a trade in grain, wool, and live stock. The principal industrial plants are the railroad machine shops of the Santa Fe, large nurseries, flouring mills, grain elevators, a foundry, carriage factories, brick and tile works, fence factory, soap works, a creamery, manufactories of windmills, gas engines and pumps, etc. Ottawa adopted the commission form of government in 1913. The city owns the water works and electric-light plant. Pop., 1900, 6934; 1910, 7650.

OTTAWA. An important Algonquian tribe originally living about the upper Ottawa River, Canada, and carrying on an active trade by water between the Eastern tribes and those of the lakes. They were the allies and friends of the French and the Huron, by which they incurred the hatred of the Iroquois. After the dispersion of the Huron, about 1645, the Iroquois turned against the Ottawa, who were compelled to abandon their country and seek refuge on Manitoulin Island in Lake Huron. After a short stay there they removed, about 1660, to La Pointe (Wis.), on the south shore of Lake Superior, where the Huron had already preceded them. Here the Jesuits resumed their mission work, but a few years later the two tribes were again driven out by the Sioux, the Huron retiring to Mackinaw, while the Ottawa returned to Manitoulin Island. Within the next 50 years they had spread over the whole of lower Michigan and into adjacent parts of Ohio and Illinois, besides holding Manitoulin and some territory on the Canadian side of Lake Huron. They took an active part on the French side in all the Colonial wars, including that headed by Pontiac, who was himself of that tribe. They joined the English side against the Americans in the Revolution and War of 1812. Several smaller bands have been removed to the West, but the great body of those in the United States are still living in small settlements scattered over lower Michigan, having no regular reservation. Those in Canada are all within Ontario Province.

OTTAWA RIVER. The principal tributary of the St. Lawrence. It rises 160 miles north of Ottawa, on the Laurentian divide, and flows first west, then southeast and east, until after a course of about 685 miles, most of it along the boundary between the provinces of Ontario and Quebec, it falls into the St. Lawrence by two mouths, which form the island of Montreal (Map: Canada, P 7). During its course it widens into numerous lakes of considerable size and is fed by many important tributaries, such as the Madawasca and Rideau on the right and the Gatineau and the Rivière du Lièvre on the left. These, with the Ottawa itself, form the means of transit for perhaps the largest lumber trade in the world, while the clearing of the lumber has opened the country for several thriving agricultural settlements. The navigation has been greatly improved, especially by the construction of dams and slides to facilitate the passage of timber over falls and rapids. The Ottawa is connected with Lake Ontario at Kingston by the Rideau Canal and is navigable for 250 miles. The projected canal from Georgian Bay to the St. Lawrence enters the Ottawa River through the Matawa, and is designed to provide a 20-foot channel from Georgian Bay to carry cargo from Chicago to Montreal and perhaps to Europe without transshipment.

OT'TENDOR'FER, OSWALD (1826–1900). A German-American journalist. He was born at Zwittau, Moravia, studied jurisprudence at Vienna, and was among those German youth who, after participating in the revolutionary troubles of 1848, sought refuge in America. Coming to New York, he acquired control of the *Staats-Zeitung* (then a weekly paper), which, at first Democratic in politics, but after 1871 independent, took rank as the foremost German-American daily. He largely endowed various institutions in his native town of Zwittau, and to New York presented a free library. Ottendorfer was active in the cause of civil-service reform. Some years previous to his death ill health necessitated his retirement from active journalistic work.

OT'TER (AS. *otor*, *ottor*, *oter*, OHG. *ottar*, Ger. *Otter*, otter; connected with OChurch Slav. *vydra*, Lith. *udra*, otter, Gk. *ὕδρος*, *hydros*, *ὕδρα*, *hydra*, water snake, Skt. *udra*, otter, also with Gk. *ὕδωρ*, *hydōr*, Skt. *udan*, water, and ultimately with Eng. *water*). The otters are a small but cosmopolitan subfamily (Lutrinæ) of fur-bearing carnivores (Mustelidæ) with aquatic habits. The North American otter (*Lutra canadensis*) is found in most parts of the continent north of Mexico, though no longer numerous in well-settled districts. It is about 4 feet in length, of which the tail is one-third. The color is rich brown. The body is long and rather stout, the legs short with rounded webbed feet, the tail broad and horizontally flattened, and the skull wide and depressed. The eyes are small and supplied with a nictitating membrane. The teeth are strong and very sharp. The whole structure is thus adapted to an aquatic life and the capture of fish. The otter makes its home in some hole in the bank, or under the roots of a tree, furnished with a bed of leaves and grass, where the female brings forth from one to three young ones in the early spring. Although ill-shaped for walking on land, otters wander about a great deal at night, crossing from one stream to another and doing much hunting in the woods and thickets; and young and old are fond of romping games in grassy places in summer, as well as in the snowbanks of winter. The otter is one of the most playful of animals, and many writers have described its favorite pastime of sliding on the inclines of snow or in summer on some steep clayey slope entering a body of water. In either case the otter lies on its belly with its fore feet bent backward, and gives the body a shove by means of its hind feet. In a short time the sliding place becomes very slippery and the otters show great delight in sliding down and then climbing back to repeat the performance. In captivity otters are rather surly and snappish, and when brought to bay in their native haunts they will fight savagely, and it requires a special breed of dogs (see HOUND) to hunt them successfully. In India and the Far East the otter is frequently kept in a half-domesticated state and used as a fish catcher. A collar is placed around the neck and to this a long line is attached. The otter is then sent into the water, and as otters always bring their prey to shore to devour it, as soon as he has captured a fish he returns to his master with it.

The European otter (*Lutra vulgaris*, or *lutra*) is widely distributed throughout Europe and Asia. It is much smaller than the American species and somewhat lighter in color. It is frequently seen along the seashore and fishes in the sea. Other species of *Lutra* occur in southeastern Asia, in Africa, and in South America.

The fur of the otter is highly prized and is an important article of commerce. The flesh has a very fishy taste, and has been accounted by many Roman Catholics as fish and not meat, so that it might be used in Lent and on fast days. A discussion of this mediæval view is one of the entertaining disquisitions in Walton's *Compleat Angler*.

Consult: British and East Indian books of zoology and sport; Oldfield Thomas, in *Proceedings of the Zoölogical Society* (London, 1889); Stone and Cram, *American Animals* (New York, 1902); E. T. Seton, *Life-Histories of Northern Animals* (ib., 1909). See OTTER; Plate of FUR-BEARING ANIMALS; and Plate of AMERICAN MINOR CARNIVORES with CARNIVORA. Cf. COYPU.

OTTER, SIR WILLIAM DILLON (1843–). A Canadian soldier. He was born near Clinton, Ontario, and was educated at Upper Canada College and at the Royal Military School, Toronto. He saw service in the Fenian raid in 1866, and from 1883 to 1889 was commandant of the School of Infantry in Toronto. During the second Riel rebellion, in 1885, he commanded a column under General Middleton, and was in command at the battle of Cut Knife Creek. In 1886 he was appointed commanding officer of the second district and in 1896 an inspector of infantry. His most notable service was during the Boer War in South Africa, in which he was in command of the first Canadian contingent. Colonel in 1900, brigadier general in 1905, and major general in 1910, Otter served as commanding officer of the Western Ontario district (1905–08), chief of the general staff at headquarters (1908–10), and in 1910 was appointed inspector general and chief military adviser to the Minister of Militia. He retired in 1912 and in 1914 was knighted.

OT'TERBEIN, ŏt'ĕr-bīn, PHILIP WILLIAM (1726–1813). A clergyman, founder of the United Brethren in Christ (q.v.). He was born at Dillenburg, Germany, and studied the classics and theology at his father's school at Herborn. After being ordained at The Hague he sailed for America to take up the work of the ministry in the German Reformed church. He first settled at Lancaster, Pa., where he remained till 1758. He then held pastorates at Tulpehocken, Pa., Frederick, Md., and York, Pa. In 1774 he accepted a call to a new congregation in Baltimore and remained there until his death. In 1768 he became associated with Martin Boehm, a Mennonite preacher, and their labors resulted in the organization of the Church of the United Brethren in Christ. The common belief that he was its first bishop or superintendent is denied by Harbaugh (*Fathers of the German Reformed Church*, Lancaster, Pa., 1857), who maintains that Otterbein, who never really left the German Reformed church, bears the same relation to the new organization that Wesley does to Methodism. Consult his *Life* by A. W. Drury (Dayton, Ohio, 1884).

OTTERBEIN UNIVERSITY. A coeducational institution for higher education founded at Westerville, Ohio, in 1847, and named for Philip W. Otterbein (q.v.). It is under the control of the United Brethren in Christ, but has on its board of trustees representatives of various denominations. The university confines itself strictly to undergraduate work. There are seven groups of study and in addition there are maintained adjunct departments of music and art and an academy. There is a summer school and special courses in education are given. There were in attendance at the university, in 1915, 565 students and the faculty numbered 27. The endowment at the end of the collegiate year 1913–14 was $250,595 and the gross annual income about $55,000. The value of the college property, including buildings and grounds, is about $525,000. The library contains about 18,000 volumes. The president in 1915 was Walter G. Clippinger.

OT'TERBURN, BATTLE OF. A battle commemorated by the ballad of Chevy Chase (q.v.).

OT'TER CREEK. A stream which rises in the northern part of Bennington Co., Vt., flows northward and enters Lake Champlain about 6 miles northwest of Vergennes (Map: Vermont, B 5). It drains an area of 925 square miles, all in Vermont. It supplies much water power.

OTTER DOG, or OTTER HOUND. See HOUND.

OTTER (or ANCON) SHEEP. An aberration or sport of the ordinary breed of sheep, which by artificial selection became the founder of a distinct breed. Seth Wright, a farmer of Dover, Mass., kept a flock of 15 ewes and one ram. In 1791 one of the ewes produced a male lamb, which after growing up was reserved for breeding purposes, the original ram being killed. In the first season "two lambs only were yeaned in his likeness," but the number grew until there resulted a small flock of the strongly marked sport, called otter breed and named ancon, by Dr. Shattuck, from the crookedness of its short forelegs, causing them while walking to appear like elbows. The body was longer than normal, the legs shorter and crooked, and the breed appears to have been perpetuated on account of its being less able than ordinary sheep to jump over fences. The interest in this sport is due to the fact that one prepotent sire impressed his peculiarities on his offspring and became the founder of a new breed. After the introduction of merinos, which are equally gregarious, quiet, and orderly, the ancon breed became extinct. See PREPOTENCY. Consult D. Humphreys, "On a New Variety in the Breeds of Sheep," in the *Philosophical Transactions of the Royal Society* for 1813 (London, 1813).

OTTER SHELL. A large edible mactroid clam (*Lutraria maxima*) of the northwestern American coast.

OTTER SHREW. A West African insectivore or kind of shrew (*Potamogale velox*), which resembles an otter, lives in clear streams, and swims with great rapidity and strength, the union of the second and third toes serving the purpose of webbing. It is larger than a weasel, dark brown in color, and has a long compressed tail, of much assistance in swimming. Little is known of its habits or food. With a somewhat similar Madagascar animal (*Geogale aurita*) it constitutes the family Potamogalidæ.

ÖTTINGER, ẽt'tĭng-ẽr, EDUARD MARIA (1808–72). A German author and humorist, born in Breslau. He wrote poems and many novels, among which latter are: *Der Ring des Nostradamus* (3d ed., 1853); *Ein Dolch oder Robespierre und seine Zeit* (3d ed., 1862); *König Jerome Napoleon und sein Capri* (2d ed., 1861). He also published *Bibliographie biographique* (2d ed., 1854), which was followed by *Moniteur des dates* (6 vols., 1866–68, continued by Schramm), and *Geschichte des dänischen Hofs* (1857–59).

OTT'LEY, ROBERT LAWRENCE (1856–). An English theologian, son of Lawrence Ottley, canon of Ripon. He was born in Richmond, Yorkshire, and was educated at King's School, Canterbury, and at Pembroke College, Oxford, of which he became honorary fellow in 1905. He was tutor at Christ Church, Oxford, in 1881, vice principal of Cuddesdon (theological) College in 1886, divinity dean of Magdalen College, Oxford (1890), principal of Pusey House in 1893, and after 1903 canon of Christ Church and regius professor of theology at Oxford. He wrote: *Lancelot Andrewes* (1894); *The Doctrine of the Incarnation* (1895); *Aspects of the Old Testament*, the Bampton Lectures (1897); *The Hebrew Prophets* (1898); *Short History of the Hebrews to the Roman Period* (1901); *The Grace of Life* (1903); *The Religion of Israel* (1905); *The Rule of Faith and Hope* (1911); *The Rule of Life and Love* (1913); *Christian Morals* (1914); *The Rule of Work and Worship: An Exposition of the Lord's Prayer* (1915).

OT'TO. See OTHO.

OTTO I (1848–). A former king of Bavaria, son of Maximilian II, born at Munich. He fought in the wars of 1866 and 1870–71. In 1872 he became insane and was placed under strict surveillance. On the death of his elder brother, Louis II (1886), he was proclaimed King, but the government was carried on by his uncle Leopold (q.v.) as Regent. Upon the latter's death in 1912 the regency descended to his son Louis (Ludwig). In 1913, owing to Otto's mental infirmities, Louis was proclaimed King with the title Louis III (q.v.).

OTTO I (1815–67). King of Greece from 1833 to 1862. He was the second son of Louis I, King of Bavaria, and was born at Salzburg, June 1, 1815. He studied at Munich. In August, 1832, the throne of Greece was offered to him by the Greek National Assembly, and in the following year he began his reign under a regency composed of Bavarians. In June, 1835, he assumed personal power, and in 1837 he married in Germany the Princess Amalie of Oldenburg. A monetary crisis, which was provoked partly by false administrative measures, threw the affairs of Greece into confusion and materially weakened the King's popularity. A national reaction against the Germanizing tendencies of the court followed, and resulted, in 1843, in a military revolution, which forced a constitution upon the King. The Bavarian ministers were dismissed, but the King and his Greek advisers attempted in various ways to curtail the privileges which the new constitution had conferred on the people. The equivocal position in which he was placed during the Crimean War, between the allied powers on the one hand and his subjects, who were strongly in favor of Russia, on the other, increased the difficulties of his situation. The Queen's pro-Russian sympathies made her for some time a favorite; but the belief that Otto's absolute measures were due to her instigation turned the tide of popular hatred so strongly against her that attempts were made on her life. The general discontent at last found vent in insurrections at Nauplia and Syra in 1862, which were soon suppressed. A more formidable insurrection in the districts of Acarnania, Achæa, and elsewhere broke out in October of the same year and in a few days extended to the whole of Greece. Otto fled to Salamis, from which place he issued a proclamation declaring that he quitted Greece to avoid civil war. He never formally renounced his right to the Greek throne. He died at Bamberg, July 26, 1867.

OTTO, JOHN CONRAD (1774–1844). An American physician, who came of a family of physicians. He was born near Woodbridge, N. J., and graduated from Princeton in 1792 as A.B. and from the University of Pennsylvania in 1796 as M.D. Settling in Philadelphia, in 1813 he was elected successor to Benjamin Rush as physician and clinical lecturer at the Pennsylvania Hospital; this position he held for over 25 years. Of his writings the best known is *An Account of an Hæmorrhagic Disposition in Certain Families* (1803), the first report in medical literature of this condition.

OTTO, MARTIN PAUL (1846–93). A German sculptor, born in Berlin, where he frequented the Academy and the studio of Karl Begas. Having received the first prize in a competition for the Tegetthoff monument in Vienna, in 1873 he went to Italy, and during a 13-years sojourn in Rome produced, among other works, the marble statues for Berlin of Wilhelm von Humboldt (garden in front of the university) and of Chodowiecki (vestibule of Old Museum) and the polychrome statue of a vestal (National Gallery). His Luther Monument, with many accessory figures (Neuer Markt, Berlin), in the competition for which he received first prize (1886), was completed after his death by Toberentz. He also modeled the statue of Emperor William I at Ems.

OTTOIA, ŏt-tō'yȧ (from *Otto*, a creek in British Columbia). The famous fossil locality of the Burgess shale of the Stephen formation in British Columbia has furnished several genera of annelids (*Ottoia*, *Banffia*, *Pikaia*) that appear to belong to the class Gephyrea. Ottoia has a cylindrical elongate body with numerous segments, a ring of hooks about the mouth, and an introversible papillose proboscis. The enteric canal is distinctly visible in the finely preserved fossils. See STEPHEN FORMATION.

OT′TOKAR II (c.1230–78). King of Bohemia from 1253 to 1278. He was a son of Wenceslas I and Princess Kunigunde of the house of Hohenstaufen. In 1251, after the extinction of the line of Zabenberg, he obtained possession of the Duchy of Austria and married Margaret, the sister of the deceased Duke. He came to the Bohemian throne on the death of his father, and the next year he took part in a crusade against the heathen Prussians, whom he defeated; he founded Königsberg in their territory. In 1260 he gained a victory over the Hungarian King, Béla IV, on the Marchfeld, and annexed Styria in 1261. The same year he procured a divorce from Margaret and married the Russian Princess Kunigunde, who was a grandchild of Béla. The duchies of Carniola and Carinthia fell to him in 1269, and he made some small additional acquisitions in 1271 and 1272. Ottokar was now one of the most powerful princes in Europe. When Rudolph of Hapsburg (q.v.) was elected Emperor Ottokar refused to recognize him. After long negotiations he was put under the ban of the Empire and defeated in battle (1276), and was compelled to give up all his possessions except Bohemia and Moravia. He soon renewed the war and perished on the Marchfeld, Aug. 26, 1278. Ottokar founded cities and encouraged commerce and manufacturing. He attempted to weaken the feudal nobility and to destroy their castles. Consult: Ottokar Lorenz, *Geschichte Königs Ottokar II.* (Vienna, 1866); Alfons Huber, *Geschichte Oesterreichs*, vol. i (Gotha, 1885); J. Kempf, *Geschichte des deutschen Reiches während des grossen Interregnums* (Würzburg, 1893); Jastrow and Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen*, vol ii (Stuttgart, 1901); Oswald Redlich, *Rudolf von Habsburg* (Innsbruck, 1903).

OT′TOMAN EMPIRE. A common designation for Turkey (q.v.).

OTTOMAN PORTE. See Porte.

OT′TO OF ROSES. See Attar of Roses.

OTTUMWA, ô-tŭm′wȧ. A city and the county seat of Wapello Co., Iowa, 90 miles southeast of Des Moines, on both sides of the Des Moines River and on the Wabash, the Chicago, Burlington, and Quincy, the Chicago, Milwaukee, and St. Paul, the Chicago, Rock Island, and Pacific, and other railroads (Map: Iowa, E 4). Among the notable structures of the city are the United States government building, St. Joseph's Academy, opera house, Y. M. C. A. building, the Union railway station, public library, city hospital, courthouse, and the handsome high and grade school buildings, of which there are 15. Ottumwa is surrounded by a rich agricultural and coal-mining district, has extensive jobbing and banking interests, and, being amply provided with water power, has developed into an important manufacturing city. The industrial establishments include large meat-packing houses, planing mills, ironworks, flour and paper mills, stone quarries, foundries, and manufactories of agricultural implements, boilers, pumps, engines, tools, machinery of various kinds, sheet-metal goods, wagons, brick and tile, clothing, candy, cigars, etc. The city was settled in 1843 and incorporated in 1849. It has adopted the commission form of government. The water works are owned by the municipality. Pop., 1900, 18,197; 1910, 22,012; 1914 (U. S. est.), 23,586.

OTUMBA, ô-tụm′bȧ. A town in the State of Mexico, Mexico, 31 miles northeast of the capital, on the Mexican Railway (Map: Mexico, J 8). It is on the site of the ancient Indian village Otompan, where Cortés, in one of the bloodiest battles of the conquest, defeated the Aztecs after his disastrous retreat from the city of Mexico.

OTUQUIAN, ŏ′tŏŏ-kē′*a*n. A linguistic stock of eastern Bolivia, South America. Consult A. F. Chamberlain, in *Journal de la Société des Américanists de Paris*, n. s., vol. vii (Paris, 1910), and in *American Anthropologist*, n. s., vol. xv (Lancaster, Pa., 1913).

OTUS, ŏ′tŭs. See Aloadæ.

OT′WAY, Thomas (1652–85). An English dramatist, author of *The Orphan* and *Venice Preserved*, two plays long famous on the British stage. He was born March 3, 1652, at Trotton, near Midhurst, Sussex. Leaving Oxford without a degree, he went to London to seek his fortune in 1671. He appeared on the stage, but made a signal failure; next he applied himself to dramatic composition. In 1675 *Alcibiades*, his first tragedy, was printed, and in the following year he produced *Don Carlos*, a play which was extremely popular. His first comedy, *Friendship in Fashion*, appeared in 1678 and met with general appreciation. After a time spent with the army in Holland he produced the tragedy of *Caius Marius* in 1680. In the same year *The Orphan* met with an extraordinary and, in some respects, a deserved success. In 1681 *The Soldier of Fortune* and in 1682 the finest of all his plays, *Venice Preserved*, were produced. From this time till his death the poet had much to endure from poverty and neglect. Debts accumulating upon him, he retired to an obscure public house on Tower Hill for the purpose of avoiding his creditors. Driven from his retreat by hunger, according to Cibber, who gives an account of him in his *Lives of the Poets*, he went out on the street to beg. Receiving a guinea from a stranger, he hastened to a baker's shop and choked himself to death in an overhasty attempt to satisfy his cravings for food. Otway's power lay chiefly in depicting the pathos of affection, and he may have been inspired by his own unhappy infatuation for Mrs. Barry, the actress. Otherwise, although he achieved a brilliant reputation during his lifetime, and though he is described by Dryden as having a power of moving the passions which he himself did not possess, Otway's plots are artificial and his work is of inferior artistic value. Consult: Thomas Thornton, *The Works of Thomas Otway* (London, 1813), containing a biography; J. Geneste, *Some Account of the English Stage* (ib., 1832); A. W. Ward, *History of English Dramatic Literature* (New York, 1899); Samuel Johnson, *Lives of the British Poets*, vol. i, edited by G. B. Hill (Oxford, 1905); E. W. Gosse, *Seventeenth Century Studies* (new ed., New York, 1914).

OUACHITA, wŏsh′ĭ-tạ (also spelled **WASHITA**) **RIVER.** A tributary of the Mississippi rising in the Ouachita Mountains west of Hot Springs, Ark., entering the coastal plain near Malvern, paralleling the fall line from there to Arkadelphia, then taking a tortuous course through alluvial bottoms, bordered by hills on the west, southward into Louisiana (Map: Arkansas, C 4). It is about 500 miles long, and near the middle of its course it rises as much as 50 feet in times of flood. Its waters enter the Mississippi by way of the Black and Red rivers near the southwest corner of Mississippi. Near Harrisonburg, La., it cuts through a rocky ridge, which forms rapids, but small steamers ascend it as far as Camden, Ark., or even to Arkadelphia when the water is very high. The United States government is now building several locks and dams along its course to improve navigation.

OUAKARI (South American name), or **UAKARI**, wȧ-kä′rē. One of three species of Brazilian monkeys closely related to the sakis, distinguished by their long silky hair and stumplike tails. The best-known species is the bald ouakari (*Brachyurus calva*, or *Cacajao calvus*), which is about 18 inches in length and has whitish fur, with the head nearly bald and the naked skin of the face brilliant scarlet. These monkeys inhabit forests of limited and local areas, often flooded for weeks at a time, have exclusively arboreal habits, and subsist almost wholly upon fruits. H. W. Bates, in his *Naturalist on the River Amazons* (London, 1910), gives a most interesting account of their habits and behavior in captivity. Consult also D. G. Elliot, *A Review of the Primates* (New York, 1913). See Cebidæ; Monkey.

OUBLIETTE, o͞o′blē′ĕt′ (Fr., from *oublier*, to forget, from Lat. *oblivisci*, to forget). A secret pit or well under the floor of a dungeon or an opening leading from a dungeon into a moat or river. Oubliettes were supposed to have been used for the secret disposal of bodies of prisoners, but there are few authenticated instances of such use.

OUDE, oud. See Oudh.

OUDENARDE, or **OUDENAARDE**, ou′de-när′de (Fr. *Audenarde*). A town in the Province of East Flanders, Belgium, on the east bank of the Scheldt, 15 miles south-southwest of Ghent (Map: Belgium, B 4). Its chief building, a fine Gothic council house (1525–35), has a beautifully decorated façade. There are also two mediæval churches and an episcopal college. The town has manufactories of linen and cotton and extensive tanneries. At Oudenarde, on July 11, 1708, the French under Vendôme were defeated by the allies under Marlborough and Prince Eugène. Pop., 1900, 6204; 1910, 6956.

OUDH, or **OUDE**, oud (Hind. *Awadh*). A province of British India, forming one of the two principal administrative divisions of the United Provinces of Agra and Oudh (Map: India, D 3). The area of the Oudh portion of the United Provinces is 24,158 square miles. Pop., 1901, 12,833,168; 1911, 12,558,004. See United Provinces of Agra and Oudh.

OUDH, oud, or **AJODHYA**, ȧ-jōd′yȧ. A suburb of Faizabad, Oudh, India. See Fyzabad.

OUDINE, o͞o′dēn′, Eugène André (1810–89). A French medalist, sculptor, and designer of coins. He was born in Paris, studied under Galle, Petitot, and Ingres, and in 1831 gained the Prix de Rome for medal engraving, his specialty. He was one of the first to design medals in the modern French style; he founded an important school and prepared the way for the modern revival of the medalist's art. Instead of reproducing, he invented his own designs, showing unfailing taste and ingenuity. He was official designer to the Internal Revenue Office and to the Mint, and in 1857 was named a Chevalier of the Legion of Honor. Among his more celebrated medals are "Napoleon's Tomb at the Invalides," "The French Republic," and commemorative medals of the siege of Paris, the Universal Exposition of 1878, and the annexation of Savoy. He also modeled a number of bas-reliefs, busts, and statues, including "Queen Bertha," Luxembourg Gardens; "Bathsheba," court of the Louvre; and General Espagne, Invalides.

OUDINOT, o͞o′dē′nō′, Charles Nicolas, Duke of Reggio (1767–1847). A marshal of France. He was born at Bar-le-Duc, in the Department of Meuse, France, April 25, 1767. He entered the army at the age of 17, and distinguished himself in 1790 by suppressing a popular insurrection in his native district. He rose quickly, in 1794 became general of brigade, and added to his reputation in the war against Prussia and Austria. He became general of division in 1799 and received important commands from Napoleon, who presented him with a sword of honor. In 1805 he received the command of 10 battalions of the reserve, afterward known as the Oudinot Grenadiers. He was present at Austerlitz (1805) and Jena (1806), and defeated the Russians at Ostrolenka, Feb. 16, 1807. He contributed to the success of the French at Friedland, June 14, and after the Peace of Tilsit was rewarded with the title of count and a large sum of money. At Wagram (July 6, 1809) he fully sustained his reputation as a general, and soon after was made marshal of France and Duke of Reggio. In 1810 he was charged with the occupation of Holland. He was engaged in the disastrous Russian campaign of 1812, when he earned praise by his skillful tactics by which the crossing of the Beresina was protected. He subsequently took part in the various battles of 1813 between the French and the allies, being defeated at Grossbeeren (Aug. 23, 1813), and fighting valiantly at Leipzig. He was one of the last to abandon Napoleon. During the Hundred Days he remained on his estates. After the Second Restoration he became a Minister of State, major guard of the Royal and commander in chief of the National Guard, and a peer of France. In 1823 he commanded the First Army Corps in the invasion of Spain and was for some time governor of Madrid. After the revolution of July, 1830, Oudinot retired to his estates, and only at rare intervals appeared in the Chamber of Peers. He died in Paris, Sept. 13, 1847. His *Souvenirs* were published in 1894.—His son, Nicolas Charles Victor Oudinot, Duke of Reggio (1791–1863), was a general in the French army. He distinguished himself in Algeria and in the revolution of 1848 and later became commander in chief of the Army of the Alps. In April, 1849, he was appointed general of the French expedition against Rome, and forced the city to surrender unconditionally on July 2. After the coup d'état of Dec. 2, 1851, he was arrested and imprisoned. He was soon set at liberty, and spent the remainder of his life in retirement. He was the author of several books on military matters.

OUDRY, o͞o′drē′, Jean Baptiste (1686–1755). A French landscape, still-life, and animal painter, born in Paris. After studying under his father, Jacques Oudry, and under Serre and Largillière, he was received at the Academy in 1719 and became a professor there in 1743. He was a great favorite at the court, and was appointed director of the Beauvais Tapestry Works and superintendent of the Gobelins, for which he executed many designs, among the most famous being the series "Hunts of Louis XV."

Oudry's paintings were largely inspired by Berchem and the Dutch. His art possesses great sincerity, freedom of execution, harmony of line, and freshness of color. Excellent examples are in the Louvre, the Wallace collection, London, the Schwerin Museum, and the Metropolitan Museum, New York. In the last-named museum (Morgan collection) is a fine set of tapestries designed by him, representing scenes from Molière's comedies. Oudry also furnished 275 illustrations for the so-called Farmers General edition of La Fontaine's *Fables*.

OUGHT'RED, ôt'rĕd, WILLIAM (1574–1660). An English divine and mathematician, born at Eton. He entered King's College, Cambridge, in 1592, where he became a fellow in 1595. He was rector at Albury, near Guildford in Surrey (1610), and about 1628 was engaged by the Earl of Arundel to tutor his son in mathematics. His principal mathematical works are: *Clavis Mathematicæ* (1631); *Trigonometria* (1657); *Solution of All Spherical Triangles* (1657); *Canones Sinuum, Tangentium, Secantium et Logarithmorum, etc.* (1657); *Opuscula Mathematica Hactenus Inedita* (1677).

OUGREE, o͞o'grā'. A town of Belgium, in the Province of Liége, situated on the Meuse, 3 miles south of Liége (Map: Belgium, D 4). It is an important industrial centre, with coal mines, blast furnaces, rolling mills, and machine shops. Pop., 1900, 13,020; 1910, 17,088.

OUIATCHOUAN, wē-ä'chwän. An affluent of Lake St. John, Canada.

OUIDA, wē'dȧ. See RAMÉE, LOUISE DE LA.

OUIMET, wē'mĕ', GÉDÉON (1823–1905). A Canadian educator and statesman. He was born at Ste. Rose, Province of Quebec, was educated at Ste. Hyacinthe and Montreal colleges, and was called to the bar in 1844. In 1867 he was *bâtonnier* of the provincial bar. He was a Conservative member of the Canada Legislative Assembly in 1857–61, of the Quebec Legislative Assembly in 1867–76, Attorney-General of the Province in 1867–73, and its Premier in 1873–75. In the latter year he was appointed Provincial Superintendent of Education, an office which he retained for 20 years, retiring in 1895 and becoming a member of the Legislative Council. As an educator he performed important administrative duties under difficult circumstances, winning the good will of the Protestant educational authorities.

OUIMET, JOSEPH ALDERIC (1848–). A Canadian statesman and jurist, born at Ste. Rose, Province of Quebec, and educated at the Seminary of Ste. Thérèse de Blainville and at Victoria University. Called to the bar in 1870, he practiced in Montreal, where he became one of the leaders of his profession. Entering politics as a Conservative in 1873, he was a member of the House of Commons for Laval until 1896. During part of this time (1887–91) he was Speaker of the House, and from 1892, a year after the death of Sir John A. Macdonald, to 1896, when Sir Wilfrid Laurier came to power, he was Minister of Public Works. Thereafter until 1906 he served as a puisne judge of the Court of King's Bench for the Province of Quebec. In 1908 he was an unsuccessful candidate for the House of Commons.

OUNCE (Fr. *once*, Sp. *onza*, It. *onza*, *lonza;* perhaps, by loss of initial *l*, supposed to represent the definite article, from Lat. *lynx*, Gk. λύγξ, lynx; according to others the *l* is ultimately connected with Pers. *yôz*, panther). A large cat (*Felis uncia*), now usually called snow leopard, which resembles the leopard, but has much rougher and longer hair and a longer and much more bushy tail; the general color is also paler, the rosette-like spots are less sharply defined, and there is a black spot behind the ears. Its range is very extensive, for it is found in Persia, northern India, Tibet, China, Siberia, and even Sakhalin. It frequents rocky ground and is adapted to cold climates, so that in the warmer countries of its range it is found at considerable elevation, ranging from 8000 to as great a height as 20,000 feet. It feeds chiefly on goats, sheep, and other quadrupeds, but rarely attacks man. Away from domesticated flocks and herds it kills wild sheep, ibexes, and goa gazelles. See Plate of WILD CATS, under CAT, and also JAGUAR.

OUNCE. See WEIGHTS AND MEASURES.

OUR AMERICAN COUSIN. A comedy by Tom Taylor, produced in 1858. At a performance of this play at Ford's Theatre, Washington, Lincoln was assassinated.

OURARI, o͞o-rä'rē. See CURARI.

OURAY, o͞o-rä' (1820–80). An Indian chief, born in Colorado, where his people, the Uncompahgre Utes, bore in their special tribal title, which is probably a corruption of "un compadre," the evidence of their friendship to the whites. Ouray himself was engaged in a fierce struggle with the Sioux in his early manhood, and his only son was captured by his enemies, never to be restored; but he was always the white man's friend, spoke and wrote Spanish, and adopted civilized habits, living for many years on a farm which he cultivated himself. His influence with his people was firm, and the tribe never broke a treaty. Ouray visited Washington several times, and brought about the sale of the Ute reservation in Colorado.

OUREBI. See ORIBI.

OURIQUE, ô-rē'k*e*. A small town in southern Portugal, noted for the victory over the Moors won by Alfonso I in 1139 (Map: Portugal, A 4). This victory secured him the kingship of Portugal. It afterward became famous in legend. The Christian forces were said to have been far less in number than the Moslems, of whom 200,000 were fabled to have been slain. Christ was said to have appeared to Alfonso, promising victory and the royal title. Consult H. M. Stephens, *Story of Portugal* (New York, 1893).

OUR MUTUAL FRIEND. A novel by Charles Dickens (1865). It contains two stories. The principal plot concerns John Harmon, the other story centres around Lizzie Hexam, the bargeman's daughter, and her lover, Eugene Wrayburn. Mr. Boffin, the Golden Dustman, and his wife connect the two stories.

OURO PRETO, ō'r*o* prä't*o* (Portug., black gold, from the color of the argentiferous rocks in the neighborhood). A city and formerly the capital of the State of Minas Geraes, Brazil, situated on the west slope of the Serra do Espinhaço, 170 miles north of Rio de Janeiro (Map: Brazil, J 8). It is a very picturesque town, with quaint buildings; but, being founded as a mining town, its location was selected only with a view to easy accessibility to the mines. It is built on the side of a very steep hill and is shut in by a mountain on one side and a narrow gorge on the other, so that it has no room for expansion. For this reason the state government was removed in 1897 to Bello Horizonte, or Minas (q.v.). Its gold mines, which formerly yielded rich returns, are now almost abandoned and the town has greatly declined. Previous to 1894 its population was 26,000; 1913 (est.), 15,000.

OUR REDEEMER AND THE PRECIOUS BLOOD OF JESUS CHRIST, Order of. See Blood of Our Saviour.

OUSE, ōōz. The chief river of Yorkshire, England (Map: England, E 3). It is formed by the confluence of two streams, the Ure and Swale, near Boroughbridge, West Riding, and flows southeastward until it joins the Trent to form the Humber (q.v.). Its total length is 61 miles and it is navigable for large vessels 45 miles to York.

OUSE, Great. A river of England rising in Bedfordshire and flowing northeast into the Wash below King's Lynn (Map: England, G 4). It is 160 miles in length and is canalized to Bedford, 74½ miles.

OUSEL. See Ouzel.

OUSELEY, ōōz′lĭ, Sir Frederick Arthur Gore (1825–89). An English Church composer and musical theorist, born in London. After his graduation from Oxford he entered holy orders and became a curate in London, after which he was appointed precentor of Hereford Cathedral in 1855 and incumbent of St. Michael's, Tenbury, in 1856. He was one of the founders, and later warden, of St. Michael's College, Tenbury, an institution for the instruction of boys in classics and choral singing, and bequeathed to it his valuable music library. He took the degree of doctor of music at Oxford in 1854 and the next year became professor of music there. He published a number of musical collections, *A Treatise on Harmony* (1868), and *A Treatise on Counterpoint, Canon, and Fugue* (1869). He was also the author of the oratorios *The Martyrdom of St. Polycarp* (1855) and *Hagar* (1873); considerable salon music; a number of anthems; and edited, with Dr. Monk, *Anglican Psalter Chants* (1872). He died at Hereford.

OUSELEY, Gideon (1762–1839). The Wesleyan apostle of Ireland. He was born at Dunmore, Ireland, Feb. 24, 1762, of a family distinguished in English history. In his youth he was reckless, but in 1791 became religious under the influence of Wesleyan soldiers stationed at his native place. He soon moved to Sligo, where he and his wife opened a school for girls and he became an evangelist, preaching with fervor and boldness in the streets and churchyards, fairs and markets, and at the wake houses. Without dismounting from his horse he preached from three to five times a day. After preaching thus for seven years he was received into the Wesleyan conference and in 1799 appointed a missionary to Ireland. He was often roughly treated by the Irish, but, being a master of the language and thoroughly acquainted with the Irish character, he succeeded in converting thousands. At the age of 74, after 50 years of devoted labor, he was still as active as ever on the highways and in the market places, preaching 14, 16, and sometimes 20 sermons a week. He was the author of several polemical publications, of which the most important is *A Short Defense of the Old Religion* (1812; reprinted as *Old Christianity against Papal Novelties;* 5th ed., 1827). He died in Dublin, May 13, 1839. Consult his *Life* by Arthur (London, 1876).

OUSELEY, Sir William (1767–1842). A British Orientalist. He was born of Irish parentage at Monmouthshire, England. He went to Paris in 1787 and there commenced his Oriental studies. In 1788 he entered the army as cornet of dragoons and, after seeing active service under the Duke of York, in 1794 left the army to continue the study of Persian and other Oriental literature at the University of Leyden. The fruits of his studies were embodied in four works published between 1795 and 1804, the earliest of which gained for him in 1797 the honorary degree of LL.D. from Trinity College, Dublin, and of Ph.D. from the University of Rostock. In 1800 he received the honor of knighthood from Lord Cornwallis, the Viceroy of Ireland. He perfected his colloquial knowledge of Persian by several months of residence in 1810 in the London household of the Persian Ambassador, Mirza Abul Hassan, and as private secretary to his brother, Sir Gore Ouseley, who had been appointed British Ambassador to Persia, went to that country in 1810, where he remained until 1813. He was elected member of several learned societies and was a prolific contributor to the *Translations* of the Royal Society of Literature. He died at Boulogne in September, 1842. His principal works are: *Persian Miscellanies* (1795); *Oriental Collections* (3 vols., 1797–99); *Tales of the Bakhityār Nāma and the Ten Virgins* (1801; new ed., 1883); *Travels in Various Countries of the East, more particularly Persia in 1810, 1811, 1812* (3 vols., 1819–23); and a *Critical Essay* (1832). He also made a translation of Ibn Haukal's *Geography* (1800) and edited Burckhardt's *Works*.

OUS′TER (OF. *ouster, oster,* Fr. *ôter,* to remove, oust, from Lat. *haurire,* to draw). At common law, the dispossession of a person from lands which he is entitled to hold. The term is, like "deforcement," a general term, comprehending the exclusion of the true possessor under a variety of circumstances. It included abatement, or the wrongful entry of a stranger on the death of the person seised and before entry by the devisee or heir; intrusion, or the entry of a stranger on the death of a tenant of a particular, or limited, estate (as a life tenant or tenant in fee) before entry by the reversioner or remainderman; and disseisin, which was the actual turning out of the lawful occupant of the premises. An ouster is distinguished from a trespass, which is a temporary encroachment on, or invasion of, the possession of another, usually without a claim of right. The remedy for an ouster varied at common law according to its nature, but always included an action to recover possession of the property. Where the ouster was from a leasehold the remedy was an action of ejectment, and this, or a modern equivalent, has superseded the earlier actions in all cases of ouster or deforcement. See Disseisin; Ejectment; Trespass.

OUTAGAMIES, ōō′tȧ-găm′ĭz. The name given by the Ojibwas to the Fox Indians.

OUT′CROP. A term applied in geology to the edges of strata which appear at the surface. The outcrop of a mineral vein is sometimes called the apex.

OUTER HOUSE. See Inner House.

OUTER RHODES, or **AUSSERRHODEN,** ous′ẽr-rō′den. See Appenzell.

OUT′LAWRY. The state of being put outside the law, i.e., deprived of all rights, whether of property or of personal liberty and security, under the law of the land. It appears to have originated as a process for constraining a person accused of an infamous crime to appear before the court having jurisdiction over the offense charged. Its origin dates back to the reign of King Alfred, and it was probably devised as the most efficient means of securing the appearance and punishment of a culprit. The courts and officers of the peace were not well organized at that time, and it was not difficult for a criminal to elude the King's officers. A decree of outlawry against an alleged criminal bound every honest person to attempt to capture him if he crossed his path. He was considered as a wild beast, the decree at a later date bearing the words *Caput gerat lupinum* (Let him bear the wolf's head), which signified that it was the right, and even the duty, of any person to knock him on the head as if he were a wolf. To harbor or render assistance to an outlaw was a capital offense. Outlawry was, therefore, practically equivalent to a sentence of death, and the outlaw was, like a convicted felon, deprived of all property rights; his land escheated to his lord, his chattels were forfeited to the King. The law in this respect continued the same until the latter part of the thirteenth century, when Magna Charta (25 Edw. I, c. 29) forbade the outlawry of an English subject without due process of law and when the wanton killing of an outlaw was prohibited. At about the same time the penalty of death ceased to be inflicted in cases of minor outlawry, i.e., where the process had issued in a civil cause or in a prosecution for a crime less than felony or treason. The decree of outlawry at that time was issued in so many cases where the accused person had not intentionally disobeyed a summons from a court or had never been informed that he was accused, that it became customary for the King, when such a case was brought to his attention, to inlaw the person. This was effected by a decree removing the ban of outlawry, and the accused could then appear and stand trial for the offense originally alleged to have been committed by him. However, the person who thus again received the protection of the law was considered a new person, as if he had just been born, and was not thereby restored to his former property rights.

The outlaw's blood was said to be corrupt, and a child born to him after the decree was incapable of inheriting, not only from the father, but from any one else. By the statute, 5 and 6 Edw. VI, c. 11, a person outlawed for treason while abroad was permitted to return to the country within a year and a day and stand trial, but no provision of this sort in regard to felony has ever been made. The Forfeitures Act, 1870, 33 and 34 Vict., c. 23, reserved forfeitures of lands and chattels to the crown in cases of outlawry for treason and felony. Outlawry for misdemeanors may still be imposed, but such a judgment amounts only to a conviction for contempt of court, although it entails a forfeiture of chattels to the crown. The sovereign alone can pardon an outlaw. The process of outlawry has not been used in England since 1859, but the above statutes are still in force.

The process of outlawry is entirely obsolete in the United States, and it is doubtful if it has been employed since the War of the Revolution. The term "outlaw" has been loosely applied in some criminal statutes to designate bandits or wandering marauders who habitually live by crime, but it has not the signification it bears under the laws of England. Consult Legge, *The Law of Outlawry* (London, 1779), and Pollock and Maitland, *History of English Law* (Cambridge, 1903). See Blood, Corruption of; Crime; Felony.

OUTPOST. A detachment of a military force placed to cover the immediate front of a camp or bivouac to secure protection from observation, annoyance, or surprise by the enemy. On the march such detachments are called advance, flank, or rear guards. The size and disposition of the outpost will depend upon many circumstances, such as the size of the whole command, the proximity of the enemy and the situation with respect to him, the nature of the terrain, etc. A suitable strength may vary from a very small fraction to one-third of the whole force. For a single company in bivouac a few sentinels and patrols will suffice; for a large command a more elaborate outpost system must be provided. It should be no stronger than is consistent with reasonable security. The most economical protection is furnished by keeping close contact with the enemy by means of outpost patrols, in conjunction with resisting detachments on the avenues of approach. The outpost should be composed of complete organizations. Upon halting after an advance towards the enemy the outpost is usually taken from the advance guard, being relieved the following morning by the new advance guard. In a retreat the outpost is generally taken direct from the main body, and becomes the new rear guard upon resuming the march.

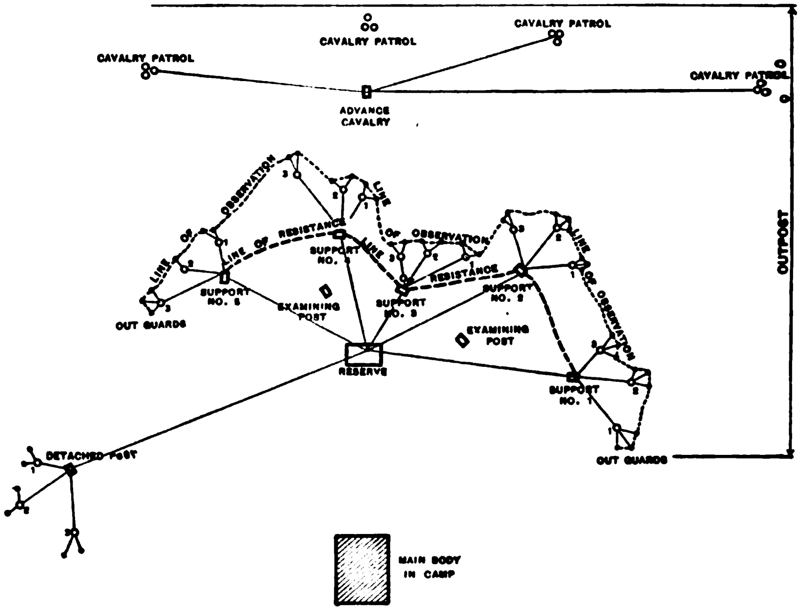
Composition. A mixed outpost is composed principally of infantry. The infantry is charged with the duty of local observation and with resisting the enemy until the main body is ready for action. Cavalry is used for reconnoissance. Artillery is useful to outposts when its fire can cover the lines of approach or hostile battery positions. It is usually necessary to withdraw the guns at night. Machine guns may also be very useful in securing the command of approaches that must be used by the enemy. Engineers are often attached to outposts to assist in intrenching, clearing the field of fire, and establishing communication. Signal troops establish wire or wireless communication between the outpost and the main body.

Distribution of Outpost Troops. The outpost will generally be divided into four parts. These, in order from the main body, are the reserve, the line of supports, the line of outguards, and the advance cavalry. The distances separating these parts and their distance from the main body will depend upon the object sought, the nature of the terrain, and the size of the command. The avenues of approach and the terrain features will control their positions. The outpost of a small force should hold the enemy beyond rifle range of the main body until the latter can deploy. The outpost of a large force should hold the enemy beyond artillery range for the same purpose.

The reserve constitutes the main body of the outpost and is held at some central point from which it can readily support the troops in front or hold a rallying position on which they may retire. In strength it may comprise from one-fourth to two-thirds of the total number composing the outpost.

The supports constitute a line of supporting and resisting detachments, varying in size from a half company to a battalion. They furnish the line of outguards. Supports are numbered consecutively from right to left. They are placed at the more important points on the outpost line, usually in the line on which resistance is to be made in case of attack.

The outguards constitute the line of small detachments farthest to the front and nearest to the enemy. For convenience they are classified as pickets, sentry squads, and Cossack posts. They are numbered consecutively from right to left in each support. A picket consists of two or more squads (eight men to a squad), but does not exceed half a company. It furnishes patrols, sentinels, double sentinels, sentry squads, or Cossack posts for observation. A sentry squad, eight men, puts a double sentinel in observation, the remaining men resting near by furnishing the reliefs. A Cossack post consists of four men, employing a single sentinel with reliefs. Sentinel posts are numbered from right to left in each outguard.



THEORETICAL DISPOSITION OF OUTPOSTS.

The advance cavalry reconnoitres in advance of the line of observation. At night cavalry usually withdraws, leaving small detachments with the supports for patrolling at a distance.

Patrols or sentinels should be the first troops which the enemy meets, and each body in rear must have time to prepare for action, the whole gradually retiring to the line of resistance previously arranged, usually on the line of supports. In addition to the outguards the commander of the outpost or the commander of the whole force may establish detached posts beyond the line of outposts.

Establishing the Outpost. The outpost is established as quickly as possible, so that the troops can the sooner obtain rest. The halt order of the commander, besides giving the necessary information and assigning camp sites to the posts of the command, details the troops to constitute the outpost, assigns a commander therefor, designates the general line to be occupied, and, when practicable, points out the position to be held in case of attack. The outpost commander, upon receipt of this order, should issue the outpost order with the least practicable delay. After issuing the initial orders the outpost commander inspects the outpost, orders the necessary changes or additions, and sends his superior a report of his dispositions.

Relieving the Outpost. Evening and shortly before dawn are hours of special danger. Special precaution is therefore taken at these hours by holding the outpost in readiness and by sending patrols in advance of the line of observation. If a new outpost is to be established in the morning it should arrive at the outpost position at daybreak, thus denoting the outpost strength at that hour.

Examining Posts. An examining post is a small detachment, under the command of an officer or a noncommissioned officer, stationed at some convenient point to examine strangers and to receive bearers of flags of truce brought in by the outguards or patrols. Though the employment of examining posts is not general in field operations, there are many occasions where their use is important; e.g., when the outguards do not speak the language of the country or of the enemy; when preparations are being made for a movement and strict scrutiny at the outguards is ordered; at sieges, whether in attack or defense. When such posts are used strangers approaching the line of observation are passed along the line to an examining post. No one except the commander is allowed to speak to persons brought to an examining post. Prisoners and deserters are at once sent under guard to the rear. Many such posts were found necessary during the long-continued trench and siege operations employed by the hostile forces during the great European War which began in 1914. Consult *Field Service Regulation, United States Army* (Washington, 1914).

OUTRAM, o͞o'tram, SIR JAMES (1803–63). A British-Indian soldier and statesman. He was born at Butterley Hall, Derbyshire, and was educated at Udny, Aberdeenshire, and afterward at Marischal College, Aberdeen. He received his commission and was sent to India as a cadet in 1819. He gained distinction in his conduct of the campaign of the wild Bhils of Khandesh against the Dang tribes; the restoration of order in the Mahi Kanta; the Afghan campaign of 1839, during which he acted as aid-de-camp to Lord Keane and in which he performed his famous perilous ride from Khelat through the Bolan Pass. He was political agent at Gujarat and afterward Commissioner in Sind, and upon the annexation of Oudh was made Resident and Commissioner by Lord Dalhousie. Owing to ill health he returned to England in 1856, but with the outbreak of the Persian War he was sent with the British forces to the Persian Gulf, with diplomatic powers as a commissioner, after which he returned to India. At the commencement of the Indian Mutiny in 1857 he was commissioned to take charge of the forces marching to the relief of Lucknow, but refused to take precedence of his friend Havelock, and took up only his civil appointment as Chief Commissioner of Oudh, serving under Havelock as a volunteer. After the relief of Lucknow he led a skillful movement up the left bank of the river Gumti, which led to a final and complete victory over the insurgents. He was next made Chief Commissioner of Oudh, in 1858 was made lieutenant general, and in 1860 received the thanks of Parliament. He took his seat as a member of the Supreme Council of India in Calcutta, but was compelled by ill health to return in 1860 to England. India founded an institution in his honor and presented him with valuable gifts, besides erecting a statue of him at Calcutta. He died at Pau, France, March 11, 1863. He is known as the Bayard of India, and was conspicuous for his fair play and generous championship of the natives of India.

OUTRE-MER, o͞o′tr'-mȧr, A Pilgrimage beyond the Sea. Sketches of foreign travel by H. W. Longfellow (1835).

OUTREMONT, o͞o′tr'-mōN′. A town in Jacques-Cartier County, Quebec, Canada, situated on the Canadian Pacific, Canadian Northern, and Grand Trunk railways, 6 miles northwest of Montreal. It is a residential town, and has practically no manufactures. In the vicinity abundant water power is supplied by Shawinigan Falls and Cedar Rapids. Pop., 1901, 1148; 1911, 4820.

OUVIRANDRANO, o͞o′vė-rȧn-drä′nȯ. See Lattice Leaf.

OUVRARD, o͞o′vrär′, Gabriel Julien (1770–1846). A French financier, born near Clisson in the Department of Loire-Inférieure. During the early years of the French Revolution he amassed a large fortune and under the Directory he became one of the principal creditors of the state. Contracts with the Spanish government netted him immense profits and his income from other sources was enormous. Between 1802 and 1804 his loans to the government amounted to nearly 300,000,000 francs. He subsequently furnished the means for Napoleon's great military undertakings. The enmity of the Emperor brought about the dissolution of the company of which Ouvrard was the head and the arrest of the banker, who from 1810 to 1813 remained in prison. Later in life he suffered imprisonment for illegal transactions on the Bourse, and after his release went to England, where he died. His *Mémoires* appeared in Paris in 1826.

OUZEL, o͞o′z'l, or **OUSEL** (AS. *osle*, OHG. *amsala*, *amasla*, Ger. *Amsel*, ouzel, of uncertain etymology). An old name of the English blackbird. It is also applied to other birds, chiefly of the thrush family. Thus, one British thrush (*Merula torquata*, or *Turdus torquatus*) is called the ring ouzel. The European dipper is very generally known as the water ouzel, and in the United States the term is restricted to the dipper (q.v.) which inhabits the Rocky Mountain region.

OVALLE, ȯ-väl′yȧ. A town in the Province of Coquimbo, Chile, on the right bank of the Limari River, 170 miles north of Valparaiso, and on the railway from La Serena to San Marco. It is situated in a well-irrigated valley, and there are numerous copper and gold mines in the vicinity. It was founded in 1831. Pop., 1907, 6998.

OVALS OF CASSINI, kȧs-sē′nė. See Cassinian Oval.

OVALS OF DESCARTES, dȧ-kärt′. See Cartesians.

OVAMBO, ȯ-väm′bȯ. The Herero name for a group of dialectically allied Bantu tribes without political unity, which call themselves Aajamba (rich ones) as opposed to the poorer Herero. They live in the interior of northernmost German Southwest Africa, extending into Portuguese territory; they are related to the peoples of the Zambesi region. Their number is set at 80,000. Through the Finnish missionaries the Aandonga tribe has become best known. Physically hardly distinguishable from the Herero, the Ovambo display profound cultural differences. Economically they depend only to a very slight extent on their herds and are essentially agriculturists, cultivating millet, Kafir corn, and beans. The men wear a clout of ox skin and wrap a piece of leather round the abdomen, while the women cover their nakedness with leather strips and sinews, on which disks of ostrich eggshell are strung. Throwing spears, bows and arrows, throwing clubs, and knives serve as weapons. A typical residence includes a complex of structures, strongly fortified by palisades and thorny hedges; within this inclosure are round huts with conical thatched roofs and daub walls. Among the Ovambo the trading instinct is highly developed and goes hand in hand with a tribal specialization in craftsmanship. Thus, the Aandonga devote themselves to the smelting of copper, but secure all their iron implements from the Unkuanjama blacksmiths; while the Ukuambi are potters and cherish the art as a guild secret. Socially there are two upper castes of noblemen and priests, respectively, in both of which descent is traced through the mother; the common people do not seem to be definitely organized. The government of the chiefs approaches an absolute despotism, which rests largely on native superstition. Belief in sorcery attains an extreme form and is connected, as elsewhere in Africa, with the institution of the ordeal.

OVANDO, ȯ-vän′dȯ, Nicolás de (c.1460–c.1518). A Spanish colonial administrator, born in Valladolid. He was a commander of the religious order of Alcántara, stood high in the favor of King Ferdinand and Queen Isabella, and in September, 1501, was appointed to succeed Francisco de Bobadilla (q.v.) as Governor of the American Indies. Leaving the port of San Lucar, Feb. 13, 1502, with a company of 2500 persons—the largest company which had hitherto been sent to the New World—he arrived at Santo Domingo April 15, and remained as Governor until replaced by Diego Columbus in 1509. He proved a successful ruler over the Spaniards, founded a number of new settlements, and did much to restrain turbulence and disorder. Towards the Indians, however, he was despotic and cruel. He prosecuted several ruthless wars against them, his soldiers putting captives to death after subjecting them to hideous tortures, and virtually enslaved many thousands of them through the establishment of the *encomienda* system, whereby they were distributed in lots of 50 or 100 among the Spaniards.

OVA′RIAN EXTRACT. See Organotherapy.

O′VARIOT′OMY. See Ovary.

O′VARY (from Lat. *ovum*, egg; connected with Gk. *ᾠόν*, *ōon*, OChurch Slav. *aye*, *yaye*, OHG. *ei*, Ger. *Ei*, AS. *æg*, Eng. *egg*). One of the pair of organs which in the female of any species produce the ova, or female reproductive bodies. They are analogous to the testes in the male. They may be described as two oval flattened bodies, 1¼ inches to 1½ inches long, ¾ inch in width, and nearly ½ inch thick, in the human subject, situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tubes. On making a section of an ovary numerous vesicles are observed in its interior. These are the ovisacs of the future ova or germs, and are termed the Graafian vesicles. Before impregnation they vary in number from 10 to 20, and in size from that of a pinhead to that of a pea, but on microscopic examination great numbers of minute undeveloped vesicles are also found to be present. At each monthly period a ripe Graafian vesicle bursts and the ovum contained in it makes its way (ovulation) by the ciliary motion of the epithelial lining along the Fallopian tube to the uterus, where, if not impregnated, it is disintegrated or passes off with the menstrual discharge.

Of the morbid conditions to which the ovary is liable by far the most important is the formation of tumors. These may be either solid or cystic. The cystic tumors (ovarian cysts), which consist of a sac containing a fluid or semifluid substance, are of much more frequent occurrence than the solid tumors. Two principal varieties of cysts are usually encountered, the first of which has its origin from degeneration of the Graafian follicle. It usually grows to the size of a fist and but rarely attains the size of a man's head. The second variety is the large multilocular cyst made up of innumerable cysts of small size which as they grow partially fuse together and form the larger loculi or subdivisions which compose the fully developed tumor. This variety of cyst arises from abnormal growth and development of the glandular epithelium of the ovary. Besides these two, a third variety, known as the dermoid cyst, also occurs not infrequently. It presents when opened a characteristic pulpy substance in which are mingled hair, nails, teeth, and pieces of cartilage, bone, etc. The ovary may undergo cystic degeneration without the formation of tumors and give rise to serious derangements of the menstrual function.

Of the solid tumors of the ovary carcinomata and sarcomata are the most important.

The modern treatment of ovarian tumors is by surgical removal; the ovary being included, as soon as their existence is recognized. Tapping of ovarian cysts is now only occasionally employed, and then only as a palliative measure.

OVARY. In flowering plants (angiosperms), that usually bulbous portion of the pistil which contains the ovules. The name was given under the mistaken impression that the ovules correspond to eggs. Of course the ovary of animals is a totally different structure, but the term has become so much a part of botanical literature that no suggested change has been adopted. Morphologically the plant ovary is a structure which involves a variable number of carpels (see Carpel). See also Flower.

OVATION. See Triumph.

OV′ENBIRD. A bird that builds a domed nest somewhat like an old-fashioned outdoor oven. The name belongs primarily to certain species of South American tree creepers of the genus *Furnarius* and family Dendrocolaptidæ, which are small, nonoscine, passerine birds with short wings, feeble power of flight, and plain brownish colors. These birds are numerous in Argentina and are familiar about village gardens and farms. Both sexes take part in the construction of the nest, which is generally in an exposed situation, remarkably large and of the shape of a dome, with a small entrance on one side. It is made of clay, mixed with a little hair or grass, well plastered together, and becomes quite firm as the clay dries in the sun. Its building sometimes requires several months. Internally it is divided into two chambers by a partition reaching nearly to the roof, the eggs (pure white) being placed in the inner chamber on a bed of soft grass and feathers. The outer chamber seems to be intended for the male. Such nests are made by *Furnarius rufus* (the hornero or baker) and some others, and a new one is constructed each year; but other species of the same genus nest quite differently.

In the United States the name "ovenbird" is given to the golden-crowned water thrush (q.v.) (*Seiurus aurocapillus*), one of the larger wood warblers. It is rather more than 6 inches long, olive green above, white, streaked with black, beneath, and with the centre of the crown pale rufous. During the summer it is found throughout North America, except west of the Rocky Mountains, and it winters from Florida and Texas southward. The nest is rather large, roofed over, with the entrance on one side. It is composed of rootlets, grasses, leaves, etc., and is made on the ground. The eggs are four or five, white, spotted with brown. The ovenbird is remarkable for uttering a sweet chattering song in the air at twilight, after the manner of the skylark, but it is better known by its customary accelerated call. Another peculiarity of the bird is that it walks with a seesawing motion accompanied by a rhythmical nodding of the head. Consult: for the South American ovenbird, W. H. Hudson, *The Naturalist in La Plata* (London, 1892); Sclater and Hudson, *Argentine Ornithology* (ib., 1888); Alfred Newton, *Dictionary of Birds* (New York, 1893–96); for the American ovenbird, John Burroughs, *Wake Robin* (autograph ed., Boston, 1904), and general handbooks and manuals.

OVERA. See Huercal-Overa.

OVERBECK, ō′vẽr-bĕk, Johann Friedrich (1789–1869). A German historical painter. He was born at Lübeck, received a careful education, and studied at the Vienna Academy. His opposition to the pseudoclassic notions then prevailing at that institution resulted in his expulsion in 1810, in company with several like-minded fellow students. They proceeded to Rome, took up their abode in the convent of San Isidoro, were joined by Schadow (q.v.), Cornelius (q.v.), and others, and became known as the Nazarenes because of their artistic views. (See Pre-Raphaelites.) To Overbeck, the high priest of this creed, art was a religious question. Becoming more and more absorbed in this ecclesiastic romanticism, he embraced the Catholic faith and dedicated his life to Christian art. As his part of a commission from the Prussian Consul Bartholdi to decorate a room in his house with frescoes illustrating "The History of Joseph," Overbeck painted "Joseph Sold by his Brethren" and the "Seven Years of Famine." The entire cycle was successfully transferred to the National Gallery in Berlin in 1887. Its success brought a new commission to decorate the Villa Massimi with scenes from Dante, Ariosto, and Tasso, of which Overbeck painted five scenes from "Jerusalem Delivered."

A sojourn at Perugia occasioned his finest and largest fresco, "The Vision of St. Francis" (1830), in the church of Santa Maria degli Angeli, near Assisi. Among his more important oil paintings are "Christ's Entry into Jerusalem" (1824) and a "Pietà" (1846), both in the Marienkirche, Lübeck; "Christ on the Mount of Olives," Hospital at Hamburg; "Holy Family," in the Munich Pinakothek, and "The Triumph of Religion in the Arts" (1831–40), in the Städel Institute, Frankfort. But it is in his drawings that Overbeck is perhaps at his best, in spite of his defective knowledge of the human figure. The most noteworthy of these include "Christ Blessing Little Children," "The Preaching of St. John," "Repose in Egypt," "The Raising of Lazarus," the cycles of "The Gospels" (40 cartoons, 1843–52), "Via Crucis," or "The Stations" (14 water-color drawings, 1857), and "The Seven Sacraments" (7 cartoons, 1861).

Overbeck's artistic creed, that the mental conception constitutes the chief merit of an art work, that outline or form is the direct vehicle of such idea, and that color and its accessories are subordinate elements, show conclusively that he must not be viewed as a colorist. Moreover, the naïve piety and tenderness of his earlier works gradually gave place to empty formalism. Consult the biographies by Atkinson (London, 1882) and Howitt (Freiburg, 1886); also, Richard Muther, *History of Modern Painting* (rev. ed., New York, 1907).

O'VERBURY, Sir Thomas (1581–1613). An English author and courtier, whose mysterious death has given a peculiar interest to his history. He was the son of Sir Nicholas Overbury and was educated at Queen's College, Oxford, from which he graduated in 1598. While on a visit to Scotland in 1601 he met Robert Carr, who became the favorite of James I of England. Through his influence Overbury rapidly rose in power. He wrote poems, the best of which is one called "A Wife." Among his intimates were men like Ben Jonson. About 1610 Carr, who had meanwhile become Viscount Rochester, fell in love with Frances Howard, Countess of Essex. Overbury was opposed to Rochester's marrying this abandoned woman, and in consequence she intrigued, until in 1613 Overbury was arrested and placed in the Tower. In this place he was poisoned by tools of the Countess and died Sept. 14, 1613. Rochester married the divorced Countess in December, 1613. The murder became public in 1616, and the four accomplices were hanged and the principals were imprisoned for several years. There is an edition of Overbury's works by Rimbault (London, 1856).

O'VERCOM'ERS. A name given to a peculiar religious society which originated in Chicago in the latter part of the nineteenth century and emigrated to Jerusalem, where they are now living. They do not use the name Overcomers themselves, but prefer to be called the American Colony in Jerusalem. They reject marriage and hold communistic views about property, accept literal interpretations of prophecy, and expect the speedy coming of Christ. They have made a small number of converts, and live a life of simple industry and charity.

OVER DARWEN, ō′vẽr där′wen. A town in England. See Darwen.

OVERFLOW BUG. A carabid beetle (*Platynus maculicollis*) of California, which occasionally becomes so numerous as to be a nuisance, although from its carnivorous habits it is ordinarily beneficial. In 1880 they were extremely abundant throughout central and southern California, and the name "overflow bug" was probably given to them at that time. When crushed they gave off an offensive odor and were called in some parts of California grease bugs.

OVERHAND KNOT. See Knotting and Splicing.

OVERLAND ROUTE. A popular term for the shortest route from Great Britain to India. The itinerary is via Paris, Lyons, the Mont Cenis Tunnel, Modena, to Brindisi, thence by steamer to Port Said, through the Suez Canal and the Red Sea to Bombay, the time occupied being about 20 or 21 days.

O'VERMAN, Lee Slater (1854–). An American lawyer and legislator, born in Salisbury, N. C. He graduated from Trinity College, N. C. (A.B., 1874; A.M., 1876), taught, was private secretary of Governor Vance and of Governor Jarvis, and having studied law privately was admitted to the bar in 1878. He established himself at Salisbury. His connection with the Governor's office had brought Overman a wide political and personal acquaintance, and he promptly entered politics as a Democrat in opposition to the Populists and Republicans. He was a member of the Lower House of the State Legislature five times, being Speaker in 1893; in 1895 was defeated for the United States Senate through a coalition of Populists and Republicans; was president of the Democratic State Convention and presidential elector at large in 1900; and in 1903 defeated his old rival, J. T. Pritchard, for the Senate. He was reëlected in 1909 and 1914. In the Senate Overman was chairman of the Rules Committee after 1913 and an influential member of the Judiciary Committee. Besides being engaged successfully in law practice and politics he was interested in business, being president of the North Carolina Railroad and of the Salisbury Savings Bank.

OVERSEERS OF THE POOR. Unpaid parish officers in England, whose chief duty it is to assess the poor rates and collect them. Overseers were first authorized in 1572 (14 Eliz., c. 5), but no specific duties were assigned. In 18 Eliz. they are called "collectors and governors of the poor." In 1597 (39 Eliz., c. 3) it was enacted that in each parish the church warden, ex officio, and "four other substantial householders" be appointed overseers, to assess the poor rates and oversee their distribution. In 1601 (43 Eliz., c. 2, the foundation of the present poor law) the number was placed at from two to four, and the time of appointment Easter. This was later changed to March 25, or within 14 days thereafter. The duties assigned them were: (1) to raise the necessary means for poor relief by taxation of the inhabitants; (2) to undertake the entire work of relief; and (3) to carry out all other measures necessary for executing the law.

For nearly a century after the reign of Elizabeth the overseers were the sole poor-law authorities. Gradually it was found necessary to place them under the supervision of the justices and to compel them to make public reports of their doings. By Gilbert's Act (22 Geo. III, c. 83) paid guardians of the poor were created to have charge of actual relief, and only the function of assessing and collecting the poor rate was left to the overseers. In 1819 the Select Vestry Act (59 Geo. III, c. 12) authorized parishes to control the overseers by appointing select vestries and to employ paid assistant overseers. Many parishes availed themselves of this permission. The Poor Law Amendment Act (4 and 5 Wm. IV, c. 76) made radical changes in the poor law and in its administration, but it continued both the overseers and the guardians, subjecting the overseers to the legal and reasonable orders of the guardians and of the justices. Overseers are appointed by the justices of the peace, and service is compulsory and unpaid. Certain persons, however, are exempt from appointment. Among them are members of Parliament, clergymen, barristers and solicitors, physicians, and officers of the army and navy. Overseers must be householders in the parish.

In discharging their function of assessment and collection of the poor rate the overseers are required each year to list the property of the parish and specify the amount due from each household. The assessment is signed by two justices of the peace and then collected. Rarely, save in emergency cases, do the overseers now have anything to do with the distribution of the money. Accounts are audited yearly by a paid official, the poor-law auditor.

Miscellaneous duties have been imposed upon the overseers in recent years. They make lists of voters for members of Parliament and lists of persons qualified to serve as constables. They appoint persons to enforce the compulsory vaccination acts, to see to the burial of dead paupers and of bodies cast on the shore, and they carry out the Nuisances Removal Act where there is no local board of health, etc. Consult Thomas Mackay, in Sir George Nicholls, *History of the English Poor Law*, vol. iii (new ed., New York, 1900). See PAUPERISM, *England*.

O'VERSKOU, THOMAS (1798–1873). A Danish dramatist, born in Copenhagen. He was an actor in his youth and early began to write for the stage. After a failure with a comedy he successfully produced three dramas, followed by other plays, some of which are still performed. Of these, *Oestergade og Vestergade* and *Capriciosa* are the best known. He also wrote a history of the Danish Theatre, *Den danske Skueplads, i dens Historie, fra dens Begyndelse til vor Tid* (5 vols., 1854–64; continued to 1874 by Collin, 2 vols., 1876).

O'VERSTONE, SAMUEL JONES LOYD, BARON (1796–1883). One of the ablest authorities on banking that England has produced. He was educated at Eton and Cambridge. On completing his studies he entered the banking and mercantile firms of Lubbock, Forster & Co. and Lubbock & Co., of which his father was the head, and upon the retirement of his father became the head of the house, which was later merged in the London and Westminster Bank. He entered Parliament in 1819 as a member for Hythe and continued to represent this constituency till 1826. In 1833 he was defeated in his candidacy for Parliament at Manchester, and did not seek to reënter public life. During his parliamentary career Loyd had shown himself a careful student of banking questions, and in 1833 he was examined at length before a parliamentary committee on banks of issue. He published his testimony and followed it in 1837 with a pamphlet of *Reflections upon the State of the Currency*. In these writings he gave forcible expression to the opinions which have been known to economists as those of the Currency school. The essence of this doctrine is that the issue of bank notes cannot be left to free competition, that it should be strictly limited to institutions offering a definite guaranty of solvency in a definite coin reserve duly provided by law and attested by publication of balance sheets. The views which he expressed were not popular, but they won many adherents and eventually found expression in the Bank Act of 1844. In 1848 and in 1857, after the suspensions of the Bank Act, he was called upon to defend the Act before parliamentary committees. In 1860 he was raised to the peerage under the title of Baron Overstone and Frothingay.

O'VERT ACT (OF., open). In criminal law, a positive act in furtherance of an intention to commit a crime, which will apparently result in the crime unless prevented or interrupted by circumstances not foreseen by the person doing the act. A mere intention to commit crime, except in case of conspiracy, is not a penal offense, and therefore it is always necessary to show some overt act in order to sustain a criminal prosecution, as for an attempt to commit a crime. An overt act is to be distinguished from a mere preliminary act preparatory to the commission of a crime, which in the absence of statute is not a criminal offense. For example, the purchase of a gun with the intention of killing another is an act of such an uncertain nature that it cannot be said that it would directly result in murder if not prevented or circumvented in some way, and would not be considered an overt act. But pointing a loaded gun at another and pulling the trigger would be an unmistakable attempt to kill, even if the powder failed to explode, as the design would be effected but for an accident. Attempts to commit crimes are variously punishable both at the common law and by statutes. In order to maintain a prosecution for treason in England some overt act must be shown, a treasonable intention not being sufficient to constitute the offense. In order to convict one so accused it is necessary to prove the act by at least two witnesses. Consult the authorities referred to under CONSPIRACY; CRIMINAL LAW. See ATTEMPT; CRIME; TREASON.

O'VERTON, JAMES BERTRAM (1869–). An American botanist. Born at Richmond, Mich., he graduated from the State university in 1894, taught at St. John's Military Academy, Delafield, Wis., in 1895–98, and studied at the University of Chicago (Ph.D., 1901) and at

Bonn (1903–04). He was professor of biology at Illinois College in 1901–04, and served as instructor in botany in 1904–07 and assistant professor in 1907–13 at the University of Wisconsin, where he became professor in the latter year.

O′VERTONE′. See Clang Tint; Harmonics; Music, Psychology of.

O′VERTURE (OF. *overture*, Fr. *ouverture*, opening, from OF. *overt*, Fr. *ouvert*, open, from OF. *ovrir*, Fr. *ouvrir*, to open, from OF. *aovrir*, *aüvrir*, to open, from Lat. *ad*, to + *deoperire*, to open, from *de*, off + *operire*, to cover, from *ob*, before + **verire*, to open; connected with Lith. *verti*, OChurch Slav. *vrěti*, Skt. *var*, to open, Oscan *vĕrū*, gate; the OF. *ovrir* may, however, be a variant of *avrir*, to open, from Lat. *aperire*, to open). In a general sense, an introduction, especially to an opera. The first operas had no overtures. They either began directly with the action or were preceded by a prologue which was sung. With the development of instruments it became customary to open an operatic performance with an instrumental prelude. These introductions, however, were nothing more than arrangements of popular madrigals for instruments. The oldest form of the overture originated in France, and here we can distinctly see the influence of the vocal style. Lully (1633–87) established this. Alessandro Scarlatti (1659–1725) began with an *Allegro*, which was followed by a *Grave* and ended with another *Allegro* or *Presto*. This form is known as the Italian overture. At that time, however, it was simply designated as sinfonia. Such sinfonie were soon used for concert performances, and composers began to write instrumental sinfonie. It was but a step to the separation of the three parts into as many distinct movements. Hence the modern symphony (q.v.). The modern overture may be divided into three distinct classes. (1) The concert overture, a work in sonata form. But there is no repetition of the first, or exposition, section. To this class belong the overtures of Beethoven, such as *Egmont*, *Coriolanus*. (2) The opera overture, consisting of a combination of various (generally the most melodious) themes from the opera. This was chiefly cultivated by Rossini, but with a more serious and artistic purpose by Weber. (3) An overture built upon themes from the opera, but with the definite purpose of giving a résumé of the action. The most famous example of this kind of overture is that to *Tannhäuser*, in which Wagner makes use of two principal themes, the chorus of the elder Pilgrims and the Venus music. In this third class of overtures we may also place the preludes of Wagner's later dramas, which lead directly, without a close, into the first act. This is the only form used by modern operatic composers, while modern instrumental composers have shown themselves partial to the concert overture. The inartistic opera overture is entirely dead. Consult H. Botstiber, *Geschichte der Ouvertüre und der freien Orchesterformen* (Leipzig, 1913). See Leitmotiv; Prelude.

OVERWEG, ō′vĕr-väk, Adolf (1822–52). A German explorer. He was born in Hamburg and studied geology at the universities of Bonn and Berlin. In 1850 he joined Barth and Richardson in their explorations of Central Africa. He reached Lake Chad with a boat which had been brought overland from Tripoli, and devoted five weeks to exploring that lake, being the first European who had ever sailed upon its waters. He then tried to penetrate the country of Yakoba, northwest of the Benue, but his health was shattered and he returned to Kuka, near which place he died. His reports appeared in *Monatsberichte der Gesellschaft für Erdkunde* (1851–52) and in *Zeitschrift für Allgemeine Erdkunde* (1853).

OV′ID (Publius Ovidius Naso) (43 B.C.–18 A.D.). A Roman poet. He was a descendant of an old equestrian family and was born on March 20, 43 B.C., at Sulmo (now Sulmona), in the country of the Pæligni. He was educated for the bar and under his masters, Arellius Fuscus and Porcius Latro, became highly proficient in the art of declamation. His genius, however, was essentially that of the poet, and the writing of verses began to absorb the time he was supposed to spend in the study of jurisprudence. By the death of his elder brother Ovid inherited all his father's property, and went, for the completion of his education, to Athens. He afterward made a tour of Asia and Sicily with the poet Macer. It is uncertain whether, on his return to Rome, he ever practiced as advocate. Although by birth entitled to aspire to the dignity of senator, he never entered the Senate; his weakness of body and indolence of habit prevented him from ever rising higher than the position of a decemvir, who convoked and presided over the court of the centumviri. While his public life was unimportant his private life was that of a gay and licentious man of letters. The restraint of marriage was always distasteful to him; twice married in early life, he soon divorced each of his wives; while he carried on an intrigue with a woman whom he celebrated as Corinna and who has been thought to have been no other than Julia, the accomplished daughter of Augustus. Before his thirtieth year he married a third time, and became the father of Perilla, of whom he was tenderly fond. Up to his fiftieth year he resided chiefly at Rome, in a house near the Capitol, and occasionally visited his Pælignan estate. His society was much courted, and his large circle of distinguished friends included Augustus and the Imperial family. By an edict of the Emperor, however, he was, in 8 A.D., commanded to leave Rome for Tomi, a town near the delta of the Danube. The sentence did not condemn him to an *exsilium*, but to a *relegatio*—or, in other words, he did not lose his citizenship, and he was not cut off from all hope of a return. The cause of this sudden banishment is a mystery, since the reason assigned in the edict, the publication of his *Ars Amatoria*, was a mere pretext, the poem having been in circulation for 10 years. His cognizance of a love affair of Julia's daughter, and the consequent displeasure of Augustus or of Livia, have been adduced with various degrees of plausibility as the cause of a sentence to which Ovid himself only mysteriously refers. The misery of his life on the inhospitable and barbarous shore of the Euxine is commemorated by the poems in the composition of which he found his solace, the *Tristia*. He became a favorite with the people of Tomi, before whom he publicly recited some poems in honor of Augustus. But his devotion to the Emperor and the entreaties addressed to the Imperial court by himself and his friends failed to shorten the term or to change the scene of his banishment, and he died, an honored citizen of Tomi, in 18 A.D. Those of his works which have come down to us, either in whole or in part, appeared in the following order: (1) *Amorum Libri III*, a revised and abridged edition of an early series. (2) Twenty-one *Epistolæ Heroidum*. (3) The *Ars Amatoria*. (4) *Remedia Amoris*. (5) *Nux*, the remonstrance of a nut tree against the ill treatment it received from the wayfarer and even from its owner. (6) *Metamorphoseon Libri XV*. This is deservedly Ovid's best-known work. It seems to have been written between the poet's fortieth and fiftieth years, and treats in burlesque spirit all the transformations recorded in legend from the creation down to the time of Julius Cæsar, whose change into a star forms the last of the series. (7) *Fastorum Libri XII*, only the first six of which remain. The poem is a Roman calendar versified, and describes the festivals appropriate to various dates and the mythic legends connected with them, from materials supplied by the old annalists. (8) *Tristium Libri V*, written during the first four years of the poet's banishment. They are mainly descriptive of his miserable fate, and are full of appeals to the clemency of Augustus. (9) *Epistolarum ex Ponto Libri IV*, similar in substance to the *Tristia*. (10) *Ibis*, a short satire against some traducer of Ovid. (11) *Consolatio ad Liviam Augustam*, held spurious by some critics. (12) *Medicamina Faciei* and *Halieuticon*, perhaps not Ovid's, of which we possess but fragments. Several of his works are entirely lost, the one best known to antiquity being *Medea*, a tragedy.

The poetical genius of Ovid has always been admired. A masterly facility of composition, a fancy vigorous and rarely at fault, a fine eye for color, and a versification very musical in its flow, are the merits which have made him a favorite in spite of his occasional slovenliness and falsity of thought. The best early edition of Ovid's entire works is Burmann's (Amsterdam, 1728). Of modern editions the best is that of Merkel revised by Ehwald (Leipzig, 1889–94). The editions of single poems, especially the *Metamorphoses*, are very numerous. An important edition of the *Heroides* by Palmer, with ample commentary and Greek translation by Planudes, should be mentioned (Oxford, 1898). Ovid has been a favorite with English translators; the *Amores* were done into English verse by Christopher Marlowe; the *Ars Amatoria* by Congreve and Dryden; the *Tristia* by Arden (New York, 1821); and many translations of the *Metamorphoses* were collected by Garth (1st ed., London, 1810; frequently reprinted). Consult: N. G. McCrea, "Ovid's Use of Colour and of Colour-Terms," in *Classical Studies in Honour of Henry Drisler* (New York, 1894); H. E. Butler, *Post-Augustan Poetry* (Oxford, 1909); W. S. Teuffel, *Geschichte der römischen Litteratur*, vol. ii (6th ed., Leipzig, 1910); Martin Schanz, *Geschichte der römischen Litteratur*, vol. ii, part i (3d ed., Munich, 1911); E. K. Rand, "Ovid and the Spirit of Metamorphosis," in *Harvard Essays on Classical Subjects* (Boston, 1912).

OVIDIO, FRANCESCO D'. See D'OVIDIO.

O'VIDUCTS. See FALLOPIAN TUBES.

OVIEDO, ō′vē-ā′ᴅō. The capital of the Province of Oviedo (the ancient Asturias, q.v.), in north Spain (Map: Spain, C 1). It is situated on the railroad between León and Gijón, 16 miles southwest of the latter. The town has been much modernized, fine wide streets have been laid out, and in the new suburb to the north of the old town there are parks, gardens, and promenades, and many attractive buildings. The principal building and the pride of the Oviedans is the cathedral (founded in 1388), the beautiful Gothic tower of which dominates the whole city. The educational institutions include the university (founded in 1604), with faculties of law, philosophy, and science. In 1915 there were 900 students in attendance. It occupies a square, one-story building and has a well-equipped meteorological observatory and a museum of natural history. Besides the university there are a provincial institute, a seminary, a school of arts, a normal school, a provincial archæological museum, and a public library of 40,000 volumes. The industries are represented by a large number of tanneries and manufactures of cloth, chocolate, flour, and bricks. There are large national establishments for the manufacture of firearms, as well as gunpowder factories and cannon foundries. Oviedo was founded in the reign of Fruela (762) and was the court of the kings of Asturias from the time of Alfonso II (c.791) to about 924. Pop., 1900, 48,374; 1910, 53,269.

OVIEDO Y VALDÉS, ē väl-dās′, GONZALO FERNÁNDEZ DE (1478–1557). A Spanish chronicler, born in Madrid. He was sent by Ferdinand to Santo Domingo, in the West Indies, in 1514, as intendant and inspector general of the trade of the New World. During his long residence in Santo Domingo he spent his leisure in acquiring an extensive knowledge of the West Indies. After his return to Spain he published at Toledo, in 1526, a *Sumario de la historia general y natural de las Indias Occidentales*, and dedicated it to Charles V. He afterward made some additions to the work, which was republished at Seville in 1535, in 21 volumes, under the title *La historia general y natural de las Indias Occidentales*. He left some other books in manuscript, including incomplete manuscripts of chronicles of Ferdinand and Isabella and of Charles V. An edition of the *Historia general* was published by the Academy of History, under the editorship of Amador de los Ríos (1851–55). Oviedo died in Valladolid. Besides his *History of the West Indies*, we mention *Las quinquagenas*, a valuable gossiping and anecdotical account of all the principal personages of Spain in his time, edited by Vicente de la Fuente (Madrid, 1880).

OVIP'AROUS ANIMALS (Lat. *oviparus*, producing eggs, from *ovum*, egg + *parere*, to bring forth). Animals that deposit their eggs either before or immediately after fertilization, so that development of the embryo takes place outside of the body. The term was formerly used in contrast with "viviparous," or bearing the young alive. This distinction is no longer maintained, partly because the egg is also alive and partly because there are all possible gradations between oviparity and viviparity, even inside of the group of mammals; for the lowest mammals (duckbill and echidna) lay slightly developed eggs provided with a tough membrane or eggshell. Thus arose the term "ovoviviparous," applied to animals of which the egg is hatched within the body of the mother, so that the young is excluded alive, although the fœtus has been inclosed in an egg almost to the time of parturition. Some fishes are ovoviviparous and so are some reptiles.

O'VIS, OVI'NÆ. See SHEEP.

O'VISACS. See OVARY.

O'VOLO (It., from ML. *ovolum*, dim. of Lat. *ovum*, egg). A convex molding much used in classic architecture and in succeeding styles. (See MOLDING.) In Roman architecture the profile of the ovolo is an exact quarter of a circle; in Greek architecture the curve is sharper at the top and quirked.

O'VULA'TION. See OVARY.

O'VULE (Fr. *ovule*, from ML. *ovulum*, little egg). The structure which in seed plants (spermatophytes) becomes a seed. The name refers to the old mistaken belief that the ovule of a plant represents the egg of an animal and that it is fertilized and so produces a new plant. The name has been so long in use that it is still retained, although its real meaning makes it very inappropriate. Really it is a spore case (sporangium, q.v.) and is entirely sexless. In gymnosperms (pines and their allies) the ovules are freely exposed, while in angiosperms (flowering plants) they are inclosed in the bulbous part (ovary) of the pistil, but in both cases their structure is the same. The central body of an ovule (Fig. 1) is the nucellus, and enwrapping it there are one or two coats called the integuments. At the apex of the nucellus the integuments leave a small passageway (micropyle, i.e., little gate) for the entrance of the pollen tube (see FERTILIZATION); and near the base of the ovule they become indistinguishable from the nucellus, this region of blending being called the chalaza. Frequently the ovule has a slender stalk, called the funiculus. Within the nucellus usually a single large spore (megaspore, q.v.) is formed, which still bears its old name embryo sac. This spore is peculiar in not being shed from its sporangium (ovule), and this fact results in making a seed out of the ovule. It is the function of this spore to germinate and produce a female plant (gametophyte), i.e., a plant which produces eggs. This female plant thus imprisoned within the seed was long ago named the endosperm (Fig. 2.). See SEED.

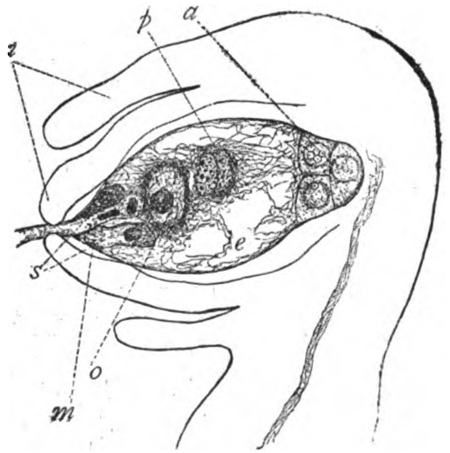


FIG. 1. OVULE.

Showing integuments (*i*), embryo-sac (*e*), antipodal cells (*a*), polar nuclei fusing (*p*), synergids (*s*), egg (*o*), and pollen tube (*m*), containing male cells.

In the true flowering plants (angiosperms) the ovules are exceedingly variable as to number and position within the ovary, which may contain one or a very large number of ovules, and these may be attached to the wall of the ovary, in which case they usually occur in definite lines; or they may be found attached to a central axis, which projects more or less into the ovary cavity. Three well-marked forms of ovules have been distinguished, and they are usually characteristic of great groups of plants. The most common form is the anatropous (inverted) ovule, in which the ovule has completely turned over and its funiculus (stalk) appears as a ridge along one side of it, the micropyle (apex of ovule) thus being directed towards the base of the funiculus. Another form is the campylotropous ovule, in which the body of the ovule itself has become curved, the micropyle thus being directed towards the ovary wall. The third form is the orthotropous ovule, in which there is no inversion or curving, but the axis of the ovule continues that of the funiculus and the micropyle is directed outward from the ovary wall. See CAMPYLOTROPOUS; and illustration in SPERMATOPHYTES.

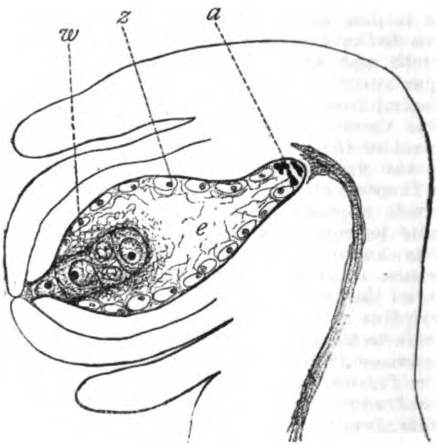


FIG. 2. AN OLDER OVULE.

Showing embryo-sac (*e*), antipodal cells degenerating (*a*), the developing endosperm (*z*), and young embryo (*w*).

O'VULISTS. See SPERMATISTS.

O'VUM, FERTILIZATION OF. See EMBRYOLOGY.

OWARI, ō-wä'rē, or **BISHIU**, bē'shōō'. A populous and wealthy province of Japan, in the island of Hondo, one of the group known as the Tokaido or East Sea Circuit (Map: Japan, E 6). It lies south of Mino, west of Mikawa, east of Omi and Isé, and is bounded on the south by Owari Bay. It has a fertile soil and is noted for its rich beds of clay, which are much used in the ceramic industries for which the province is noted. Near Nagoya (q.v.), the chief town, lies the village of Seto, where in 1297 the ceramic art of Japan had its origin; having been introduced by a native of the village, one Kato Shirozayemon (or briefly Toshiro), who had studied in China. The province is also noted for its shippo or cloisonné enamels. Owari is included in the Ken or Prefecture of Aichi.

O'WATON'NA. A city and the county seat of Steele Co., Minn., 68 miles south of St. Paul, on the Straight River and on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, and the Chicago, Rock Island, and Pacific railroads (Map: Minnesota, D 6). It has Pillsbury Academy, Sacred Heart Academy, and the State Public School for Dependent and Neglected Children. Other fine structures are the courthouse, city hall, public library, the public schools, the opera house, a handsome bank building, State armory, and the city hospital. There are four steel bridges and four parks—Central, Mineral Spring, Morehouse Playground, and Dartt's. A productive farming district is tributary to Owatonna, and the city has also noteworthy industrial interests, its plants including flouring mills, foundries and machine shops, a large ventilator and cupola factory, a butter-tub factory, soap works, nurseries, cannery, and establishments manufacturing churns, gasoline engines, seeders, fanning mills, wagons, sleighs, automobiles, etc. Settled in 1855 and incorporated 10 years later, Owatonna is governed, under a home-rule charter of 1909, by a mayor, elected biennially, and a council. There are municipal water works. Pop., 1900, 5561; 1910, 5658.

OWE′GO. A village and the county seat of Tioga Co., N. Y., 21 miles west of Binghamton, at the confluence of the Susquehanna River and Owego Creek, and on the Erie, the Lackawanna, and the Lehigh Valley railroads (Map: New York, D 6). It is a summer resort and an attractive residential place. It has a handsome courthouse and the Coburn Free Library. Considerable trade is carried on in farm produce and lumber. There are creameries and manufactories of wagons, steel bridges, automobiles, motor cycles, flour, silk and leather gloves, shirts, harness, and cigars. The village was first settled by white people in 1785 and was incorporated in 1827. It is governed under a charter of 1851, as amended in 1891, which provides for an annually elected president and council of six trustees, three of whom are elected annually. Owego, meaning "the place where the valley widens," occupies the site of a small Indian village which was destroyed by General Clinton in 1779. Pop., 1900, 5039; 1910, 4633.

OWELTY OF PARTITION. See PARTITION.

OWEN, ō′ĕn, DAVID DALE (1807–60). An American geologist, son of Robert Owen. He was born in Scotland, but came to the United States in 1823, took a degree from the Ohio Medical College, and for some years studied his profession and the sciences in Europe. In 1833 he returned to the United States and was soon appointed State geologist of Indiana. Under the direction of the Legislature he made a geological survey of the State, in 1839 was employed by the United States government to make a survey of the mineral lands of Iowa, and in 1848 made similar surveys in Minnesota and adjoining Territories. The results of his work were published by order of Congress. He was employed from 1852 to 1857 in surveys of the same nature in Kentucky, and in 1857 was appointed State geologist of Arkansas. Owen contributed numerous articles to the *American Journal of Science* and other publications on geological topics, mainly bearing upon his work in the Middle West. He coöperated on the volume, *Report of a Geological Survey of Wisconsin, Iowa, and Minnesota and, incidentally, of a Portion of Nebraska Territory* (1852).

OWEN, DOUGLAS (1850–). An English barrister and expert on maritime questions. He was educated at King's College, London. Through his connection with the Alliance Marine Assurance Company and with the Association of Average Adjusters he came to be recognized as an expert on ocean transportation and insurance. He was called to serve on various governmental special committees dealing with maritime subjects, to lecture on ocean transportation at the London School of Economics and at the Royal Naval War Colleges, and to serve as chairman of the advisory committee of the State War Risk Insurance Office during the European War which broke out in 1914. His publications include: *Declaration of War* (1889); *Marine Insurance Notes and Clauses* (3d ed., 1890); *Maritime Warfare and Merchant Shipping* (1898); *Ports and Docks* (1904); *Ocean Trade and Shipping* (1914).

OWEN, SIR HUGH (1804–81). A Welsh educationist, born in Anglesey and privately educated in Carnarvon. Entering the office of the Poor Law Commission in 1836, he was chief clerk of the Poor Law Board from 1853 to 1872, when he resigned to devote himself entirely to the promotion of education in Wales. In 1839 he had been secretary of a movement to open a British school in Islington; in 1843 he wrote a *Letter to the Welsh People*, designed to arouse interest in education; and in 1846 he was instrumental in establishing the Cambrian School Society as a branch of the British and Foreign School Society. He contributed frequently to the Welsh magazines articles and letters to popularize the idea of a state-aided undenominational school system. In his later years his chief efforts were devoted to the promotion and organization of Welsh intermediate and higher education. The Bangor Normal School and the University College of Wales attest his efforts. In addition to educational activities Sir Hugh devoted much thought to philanthropic work.

OWEN (Lat. *Audoenus*), JOHN (c.1560–1622). An English epigrammatist. He was born at Llanarmon (Carnarvonshire), was educated at Winchester and at New College, Oxford, where in 1584 he became fellow, and from 1591 to about 1594 was a schoolmaster at Trelleck (Monmouthshire). Appointed then to the headmastership of the free school of King Henry VIII at Warwick, he soon became known for his felicitous Latin epigrams, the first collection of which he published in 1606 as *Joannis Audoeni Epigrammatum Libri Tres.* He found a patron in John Williams, Bishop of Lincoln and Lord Keeper of the Great Seal. His work is uneven in quality, but at its best is caustically shrewd and pointed and exceedingly skillful in its use of Latin idiom. What is perhaps his most frequently quoted line,

Tempora mutantur, nos et mutamur in illis

(book viii, 58, 1), is derived from Matthias Borbonius' compilation, *Delitiæ Poetarum Germanorum* (Frankfort, 1612), where in the form 'Omnia mutantur,' etc., it is attributed to the Emperor Lothair I. The best edition of the collected epigrams is by Renouard (Paris, 1794). There are English renderings by Vicars (1619), Hayman (1628), Harflete (1658), Pecke (1659), and Harvey (1677–78).

OWEN, JOHN (1616–83). A nonconformist divine. He was born at Stadhampton, Oxfordshire, in 1616, of an ancient Welsh family. In 1631 he matriculated at Queen's College, Oxford, but in 1637 he was forced to leave the university because of opposition to Laud's statutes. When the Civil War broke out he warmly espoused the cause of the Parliament. He removed to London and published his *Display of Arminianism* (1643), which proved very acceptable to the Puritan party and secured him the living of Fordham in Essex. From here he removed to Coggeshall, a neighboring vicarage.

His views of Church government underwent a change, and from a Presbyterian he became an Independent, modeled his church on congregational principles, and wrote in advocacy of the latter. He preached before Parliament on the day following the execution of the King, but discreetly avoided a vindication of the act. In 1651 the House of Commons appointed him dean of Christ Church, Oxford, and the following year he was admitted vice chancellor of the university. He was also returned to Parliament, but was unseated because of his orders. After Cromwell's death he was ejected from his deanery; but he had powerful friends at court, and was allowed to preach, notwithstanding the Conventicle Act and the revocation of the Declaration of Indulgence, and in 1673 became pastor of a large Independent congregation in Leadenhall Street, London. In 1663 Owen was called to the First Church of Boston, Mass., but declined the call then and when it was renewed in 1665. In 1669 he joined several other dissenting ministers in a protest against the treatment of the Baptists in Massachusetts, and in 1672 recommended a president for Harvard College, to which he had himself been called in 1670. Among his publications may be mentioned: *A Discourse Concerning Liturgies and their Imposition* (1662); *Exercitations on the Epistle to the Hebrews* (1668–84), usually considered Owen's greatest work; *Truth and Innocence Vindicated* (1669), a reply to Parker's *Discourse on Ecclesiastical Polity; Justification by Faith* (1677); *Christologia* (1679); and the final expression of his views in *An Inquiry into the Original Nature of Evangelical Churches* (1681). His works have been edited by Russell, with *Life* by Orme (28 vols., London, 1826), and by Goold, with *Life* by Thomson (24 vols., ib., 1850–55). Consult James Moffatt, *The Golden Book of John Owen* (London, 1904).

OWEN, SIR RICHARD (1804–92). An English comparative anatomist, born at Lancaster, July 20, 1804. He studied medicine in Edinburgh and London. He became a member of the Royal College of Surgeons in 1826 and practiced his profession in London, but was soon appointed assistant curator of the Hunterian Museum and began to devote himself to the anatomy of animals. In 1834 he was appointed to the chair of comparative anatomy at St. Bartholomew's Hospital and in 1836 became the first Hunterian professor of anatomy and physiology in the College of Surgeons. This position involved the delivery of 24 annual lectures, but gave him time for much original research, the published results of which brought him much renown and won him the friendship of the most distinguished of his contemporaries, from the Queen and Prince Albert down. The last 40 years of his life were spent at Sheen Lodge in Richmond Park, which was given him by the Queen.

The second period of his career began in 1856, when he resigned his professorship and took the new post of superintendent of the natural history departments of the British Museum, which had previously been under the care of literary men with no special scientific training. He soon found that definite activity in the administration of the Museum was neither expected nor desired, and accordingly devoted himself with great energy to original research, making full use of the splendid collections under his hand. Having now little opportunity for dissection, he spent most of his time on osteology and especially paleontology. A large amount of highly important work was accomplished, including the arrangement and revision of Hunter's manuscripts and his own great book on the *Anatomy and Physiology of the Vertebrates* (1866–88). Owen is justly regarded as the greatest English comparative anatomist and paleontologist, and during the greater part of his life was considered Cuvier's successor in these fields. His philosophical writings, however, founded as they were on the archetypal theories of Oken, were of much less importance and have had no influence upon modern biological thought. In 1883 he left the Museum, to which he had rendered priceless services, and spent the remaining years in retirement. He was made a K.C.B. in 1884. Of the innumerable works published during a literary activity of 62 years at least the following should be mentioned: *Odontography* (1840–45); *Comparative Anatomy of the Invertebrate Animals* (1843); *British Fossil Mammals and Birds* (1846); *British Fossil Reptiles* (1849–84); *Experimental Physiology* (1882). Consult his *Life* by his grandson (London, 1894), which gives a complete list of his minor writings.

OWEN, ROBERT (1771–1858). An English social reformer, born May 14, 1771, at Newtown, Montgomeryshire, North Wales. He was the son of poor parents and was apprenticed at 10 years of age to a draper. He developed an unusual power of organization and at 19 became manager of a cotton mill employing 500 hands. The enterprise was successful and Owen soon organized the Chorlton Twist Company, which later bought the large cotton mills at New Lanark of David Dale, whose daughter Owen married in 1799. Owen assumed the management in 1800, and New Lanark soon achieved wide reputation both for its industrial success and the prosperity of the employees. It was visited by the most prominent men of Europe. Owen opened pleasure resorts for the employees, stopped the employment of young children, and introduced a system of education far in advance of his time; improved the houses; furnished provisions at fair prices; and established insurance funds for sickness and old age. In 1813 he published his *New Views of Society, or Essays upon the Formation of the Human Character*, in which he held that character is wholly the result of the environment. Called before a parliamentary committee in 1817 to testify regarding the causes of poverty and the means of avoiding it, he outlined the plan of a coöperative village. From this time it was his constant dream to found an ideal community. Disciples of Owen started a colony at Motherwell, and later at Orbiston and other places, but all failed. In 1824 Owen came to America and founded at his own expense a community in Indiana at New Harmony (q.v.). This likewise failed. In 1828 Owen went to Mexico, hoping there to carry out his schemes, but was disappointed. His connection with New Lanark ceased in the same year. In 1832 he sought to establish at London a National Labor Equitable Exchange, but this did not prove a success. In 1835 he wrote the *New Moral World*. For the rest of his life he was an advocate of Socialism, and in his old age he became a believer in Spiritualism. He was not discouraged by his failures, but labored throughout his life to better conditions, expending his entire fortune on his social schemes. The words Socialism and Socialist were used during the discussions in connection with the association of all classes of all men founded under the auspices of Owen in 1835. Owen died in his native town, Nov. 19, 1858. Consult his autobiography (London, 1857); Sargent, *Owen and his Social Philosophy* (ib., 1860); Booth, *Robert Owen* (ib., 1869); Jones, *Life of Robert Owen* (ib., 1892); Frank Podmore, *Life of Robert Owen* (2 vols., New York, 1906).

OWEN, Robert Dale (1801–77). A social reformer and author, son of Robert Owen (q.v.), born at Glasgow, Scotland, Nov. 9, 1801. He was educated at home and in Switzerland. He came to the United States in 1825, aided his father to found New Harmony in Indiana, went back, on the failure of that scheme, to England, but presently returned and became a citizen of the United States. From 1828 to 1832 he published with Francis Wright in New York the *Free Inquirer*, a Socialistic and anti-Christian weekly. He then went to New Harmony, and in 1835 was elected to the Indiana Legislature, where he distinguished himself by securing appropriations for the public-school system. He was a member of Congress in 1843 and for two successive terms, and took a leading part in the settlement of the northwestern boundary, in the Oregon question, and in founding the Smithsonian Institution. Failing reëlection in 1847, he took an active part in State politics, especially in furthering the legal rights of married women to property. From 1853 to 1858 he was Minister at Naples. During the Civil War he served in the Ordnance Commission and the Freedmen's Bureau and published an important open letter to Lincoln on emancipation. Owen was also a zealous advocate of Spiritualism. His chief publications, besides those mentioned above, are: *Outlines of the System of Education at New Lanark* (1824); *Moral Physiology* (1831); *Discussion with Origen Bachelor on the Personality of God and the Authority of the Bible* (1832); *Footfalls on the Boundary of Another World* (1859), perhaps his best-known work; *The Wrong of Slavery* (1864); *Beyond the Breakers* (1870); *Debatable Land between this World and the Next* (1872); and the autobiographical *Threading my Way* (1874), which deals with the first 27 years of his life. He died at his summer residence on Lake George, N. Y., June 17, 1877.

OWEN, Robert Latham (1856–). An American lawyer, legislator, and financial expert. He was born at Lynchburg, Va., graduated from Washington and Lee University in 1877, studied law, and practiced in Virginia and finally in Muscogee, Okla. In 1884 he became owner and editor of the *Indian Chieftain* and from 1885 to 1889 he was United States agent for the five civilized tribes. During this time he was also active in politics, serving as a member of the Democratic National Committee from 1892 until 1896 and as vice chairman of that committee in 1906. He organized the First National Bank of Muscogee and was its president from 1890 to 1900. In 1891 he drafted a bill which later became law granting United States citizenship to all the Indians of the Territory. On Oklahoma's admission to statehood Owen was appointed to the United States Senate, in 1907 was elected, and in 1913 was reëlected. When the Democratic party secured control of the Senate in 1913 Owen was selected for the chairmanship of the important committee on banking and currency and was one of the framers of the Glass-Owen Currency Act creating the regional reserve banking system, one of the constructive achievements of the Wilson administration. Owen was regarded as an advocate of progressive and advanced legislation such as the initiative, referendum, and recall, and was president of the National Popular Government League. As one of the lawyers in the notable case of the Pacific Coast Telephone and Telegraph Company *v.* Oregon he argued that the adoption of the initiative and referendum amendment to the State constitution did not operate to deprive Oregon of a republican form of government, and the Supreme Court upheld the contention.

OWENS, ō'ĕnz, John Edward (1824–86). An American comedian, born in Liverpool, England, but taken to the United States when three years old. He began his stage career in Philadelphia in 1841, and within a few years his popularity won him a fortune. His Solon Shingle (1864) was famous both in the United States and in England; among his other favorite characters were Dr. Pangloss and the old man in *Esmeralda*, in which he last appeared in New York. Owens died at his home near Towson, Md., Dec. 7, 1886.

OWENSBORO, ō'ĕnz-bŭr-ō. A city and the county seat of Daviess Co., Ky., 114 miles by rail southwest of Louisville, on the Ohio River and on the Louisville and Nashville, the Louisville, Henderson, and St. Louis, and the Illinois Central railroads (Map: Kentucky, C 4). It is the seat of the Owensboro Female College (nonsectarian), opened in 1890, and of St. Francis Academy (Roman Catholic). Prominent features of the city are a fine United States government building, the high school, Carnegie library, two hospitals, numerous parks and playgrounds, the county jail, and the county courthouse. Owensboro is surrounded by a farming and stock-raising country, and in the vicinity are valuable forests and deposits of coal, clay, building stone, iron, zinc, and lead ores. Oil wells are in operation near the city. Owensboro has steamboat communication with important points on the river, and has developed extensive commercial interests, particularly in tobacco, being one of the largest leaf and strip tobacco markets in the United States. Its manufactures are extensive and varied. There are numerous tobacco factories, whisky and brandy distilleries, buggy, carriage, and wagon factories, foundries, a wheel factory, planing and flour mills, a furniture factory, and a cellulose factory. The government, under a legislative charter, is vested in a mayor, who holds office for four years, and a council. Administrative officials are chosen by popular vote. The electric-light plant and water works, together costing more than $600,000, are owned and operated by the city. Pop., 1900, 13,189; 1910, 16,011; 1914 (U. S. est.), 17,212.

OWENS COLLEGE. See Manchester, University of.

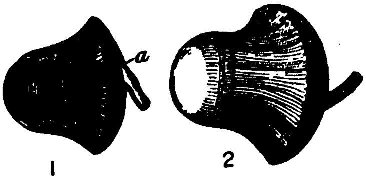
OWEN SOUND. The capital of Grey Co., Ontario, Canada, and a port of entry on Georgian Bay, Lake Huron, at the mouth of the Sydenham River and on the Canadian Pacific and the Grand Trunk railroads, 122 miles by rail northwest of Toronto (Map: Ontario, E 4). The harbor is excellent, with a dry dock 300 feet long, and is surrounded on three sides by wood-crowned heights. Owen Sound is a port of call for several steamship lines, by which it has communication with Canadian and American lake ports. The sound is 12 miles long and navigable by the largest ships. The public buildings and institutions include the town hall, courthouse, two theatres, and a public library. The industrial establishments include cement plants, saw mills, cold-storage plants, foundries, flour mills, and manufactories of chairs, nuts and bolts, tables, woodenware, mill machinery, agricultural implements, stoves, furniture, confectionery, sashes and doors, turbine water wheels, wire fences, wire nails, etc. In 1910 the value of the manufactured output was $2,852,-267, an increase of 143 per cent over that of 1900. A United States consul resides here. Pop., 1901, 8776; 1911, 12,559.

OWENS RIVER. A river of eastern California (Map: California, G 5). Its basin, which is about 150 miles long and from 20 to 25 miles wide, lies between the Sierra Nevada on the west and the White Mountains on the east, but practically the entire flow comes from the Sierras, whose east slope the stream drains from Mount Lyell to some distance south of Mount Whitney. The mountains rise from this valley to elevations of from 13,000 to 14,000 feet and are very rugged and precipitous. The river empties into Owens Lake.

OWL (AS. *ule*, OHG. *uwila, ula, huwela*, Ger. *Eule*, owl; probably onomatopoetic in origin). Any of a numerous and well-defined group of birds, the nocturnal birds of prey, constituting the Linnæan genus *Strix*, now the suborder Striges or the order Strigiformes. Although they were formerly placed unhesitatingly in the order Raptores, of recent years there has been a realization of the artificial character of this association, and they have been isolated, and placed next to the nightjars, which they resemble to a remarkable degree. In appearance the owls are distinguished from all other birds by the large size of their heads and their great eyes, which are directed forward and surrounded by more or less perfect disks of feathers radiating outward and nearly hiding the small hooked bill. The claws are sharp and curved, but, like the bill, less powerful than in the Falconidæ. The outer toe is generally reversible at pleasure, so that the toes can be opposed two and two, to give greater security of grasp. The wings, although generally long, are less adapted for rapid and sustained flight than those of the diurnal birds of prey, and the bony framework by which they are supported and the muscles which move them are less powerful. The owls in general take their prey, not by pursuit, but by surprise, to which there is a beautiful adaptation in the softness of their plumage and their consequently noiseless flight, the feathers even of the wings being downy and not offering as firm a resisting surface to the air as in falcons. The soft and loose plumage adds much to the apparent size of the body and also of the head, but the head owes its really large size to cavities in the skull between its outer and inner tables or bony layers, which cavities communicate with the ear and are supposed to increase the sense of hearing. This sense is certainly very acute, and the ear is, in many of the species, very large, and has a concealed yet external conch, which is found in few other birds. The feathers immediately surrounding the ear are often arranged in a kind of cone, serving a purpose like that of an ear trumpet. Owls can see well in twilight or moonlight, but poorly in the glare of the day. The eye itself is highly perfected and the pupil remarkably contractile. The legs and feet of owls are usually feathered to the toes, and in many species even to the claws.

EAR OF AN OWL.

Showing the position and external appearance of the ear of a great horned owl; also the filamentous feathers about the beak.



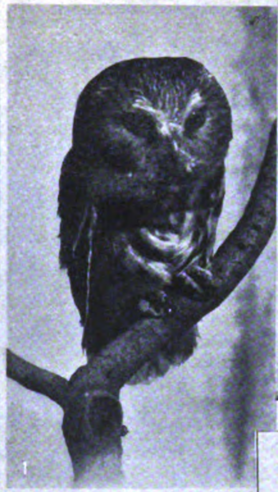
EYE OF AN OWL.

1, section of the eye, showing the interior parts of the pecten at the insertion of the optic nerve (*a*) by which the vision is regulated under the great possible expansion and contraction of the eye. 2, sclerotic coat, showing the stave-like pieces, connected by elastic tissue, permitting great expansion and contraction.

The digestive organs much resemble those of the Falconidæ, but there is no crop and the stomach is more muscular. The gullet is very wide throughout, and owls swallow their prey either entire or in very large morsels, the indigestible parts gathering into little lumps or pellets, which are ejected after a time. These pellets are to be found numerously where owls roost or nestle, and their examination reveals the bird's bill of fare. The largest species feed on hares, fawns, and gallinaceous birds; others on small mammals, reptiles, birds, and large insects. Although they capture many small birds, mice form the principal element in their diet, and the owls are thus highly beneficial to agriculture and should everywhere be protected and encouraged by farmers. Some owls also feed largely on fish (see KETUPA), crabs, and the like, which they catch for themselves.

The order of owls falls into two families—the Celuconidæ, or barn owls, and the Strigidæ, including all others—which are distinguished by differences in structure especially marked in the sternum, the relative length of the inner toe, and the wing feathers. The former group is typified by the barn owl, the latter by the big barred or cat owl. In size owls vary greatly. The largest known species is the circumpolar gray owl (*Scotiaptex nebulosa*), from 27 to 28 inches long and more than 5 feet across the wings. The smallest known owl is the curious elf owl (*Micropallas whitneyi*) of Arizona, which is less than 6 inches long and is further remarkable as having only 10 tail feathers; all other owls, so far as known, have 12. All owls have a general likeness in colors—a mixture of browns, whites, and yellows, as becomes nocturnal marauders who wish to remain unobserved, especially during the day when they are at rest. The Arctic owl becomes purer white with advancing age. There is little difference between the sexes, and the young, called owlets

REPRESENTATIVE OWLS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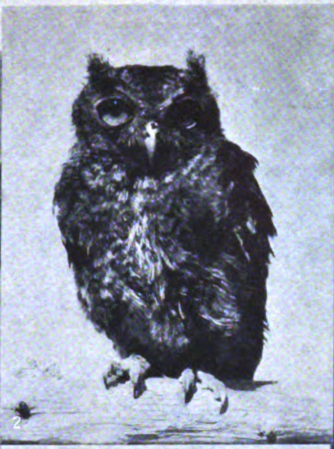
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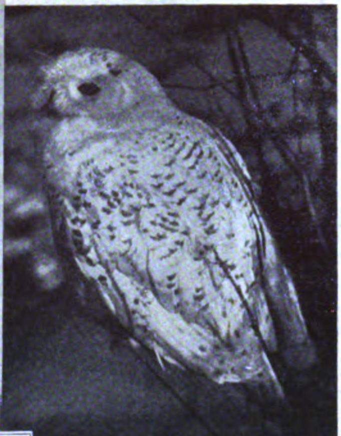
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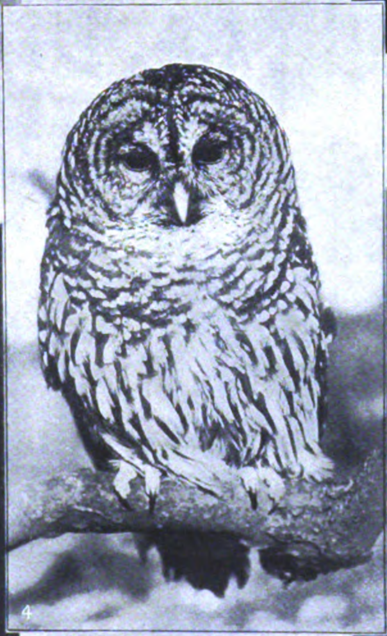
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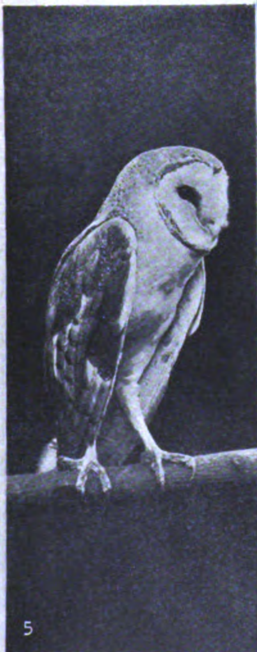
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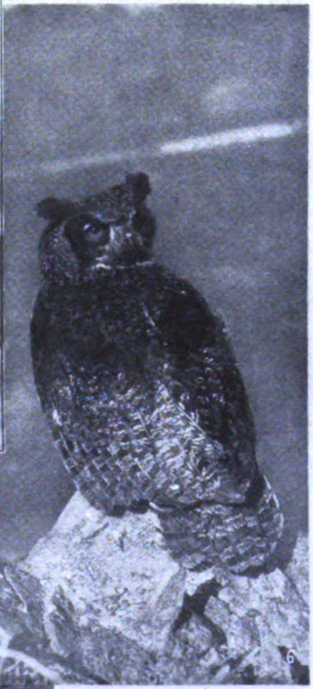
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1. SAW-WHET OWL (Cryptaglaux acadica).
2. SCREECH OWL (Otus asio).
3. SNOWY OWL (Nyctea nyctea).
4. BARRED OWL (Strix varia).
5. BARN OWL (Aluco pratincola).
6. GREAT HORNED OWL (Bubo virginianus).
7. BURROWING OWL (Speotyto cunicularia).

or howlets, resemble the adults. Owls are found in all parts of the world and in all climates, and rather more than 400 species and subspecies are known. Of these 18 species occur in North America, besides two dozen more or less recognizable subspecies, and about 15 species are natives of Europe. Some have a very wide geographical range, especially those of northern regions, and it is doubtful whether several species separately named in Europe and North America are really distinct species, e.g., the barn owl (q.v.). Another very widely distributed bird is the short-eared owl (*Asio accipitrinus*, or *flammeus*), which occurs in nearly all parts of the world. It is 15 inches long, variegated tawny and dark brown, with short ear tufts of few feathers. It is common in the United States, is somewhat migratory, and is occasionally seen in small flocks. A closely related species, rather more common generally, with long ear tufts, is the American long-eared owl (*Asio wilsonianus*). The hawk owl, snowy owl, and great horned or eagle owl (qq.v.) are other handsome circumpolar groups.

Other well-known American owls are the screech owls (*Megascops*, or *Otus*, *asio*, with about eight subspecies). They are little owls, only 9 to 10 inches long, with ear tufts, and are found in all parts of the United States and Canada. They are of special interest because of their remarkable dichromatism (q.v.), some of the birds having the prevailing tint gray, while others are rusty red. The barred owl, without ear tufts, is a large species, also common throughout the United States. In the Southwestern States are found several species of little owls which feed largely on insects and are known as gnome owls and elf owls. They are only 6 or 7 inches long and are not specially nocturnal. They belong to the genera *Glaucidium* and *Micropallas*. Another peculiar and interesting species is the burrowing owl (q.v.) of the Plains. It is not the only owl which inhabits holes in the ground. The boobook of Australia (*Ninox*, or *Spiloglaux*, *boobook*) is a species of owl which frequently repeats during the night the cry represented by its name, as if it were a nocturnal cuckoo, as the inhabitants generally believe.

Of British species one of the most common and familiar and the one most often referred to in literature is the tawny, brown, or ivy owl (*Syrnium aluco*), which is of medium size and mottled ash gray and brown, with the under parts lighter. It inhabits church belfries, ruins, ivied walls, and like places, often in a semidomestic condition. One of the best accounts of it (and of the next-named species) is to be found in Charles Waterton's *Essays*. Another generally interesting species is the little owl of southern Europe, called chevêche by the French and civetta by the Italians, which is the one regarded by the ancients as the familiar of Minerva, a symbol of wisdom, and hence became the emblem of Athens. It is the *Carine*, or *Athene*, *noctua* of modern ornithology. This small species is brown, mottled with white oval spots, has no horns, and its great eyes are surrounded by horizontally oval disks, like big spectacles, giving it a very knowing expression. It is numerous, comparatively tame, and lives well in aviaries.

It is evidently from the owl's cry that the word "owl" is derived, as well as many of its synonyms in other languages and of the names appropriated in different countries to particular species, in most of which the sound *oo* or *ow* is predominant. Nevertheless the notes of some of the smaller ones, as the common American mottled owl, are low and melodious—a pleasant rippling ululation. Many of the owls have also another and very different cry, which has gained for more than one of them the appellation screech owl, and to which, probably, the Latin name *strix* and some other names are to be referred. The superstitions concerning owls persist and belong to savage as well as to civilized peoples. The folklore of the uncivilized world is full of such notions. European peasants connect the birds with death signs; the Andalusians say they are the Devil's birds and drink the oil from the lamps in saints' shrines; and the Malagasy consider them embodiments of the spirits of the wicked. Even the birds and squirrels of the woods mob the owl unmercifully when one is discovered dozing in its retreat; but this is merely in recognition of a natural enemy taken at a disadvantage.

Bibliography. See standard ornithologies and faunal works, especially Alfred Newton, *Dictionary of Birds* (New York, 1893), and A. H. Evans, *Birds* (ib., 1900). For North America, consult the writings of Wilson, Audubon, Nuttall, Coues, and recent ornithologists, especially A. K. Fisher, *Hawks and Owls of the United States* (Washington, 1893); C. W. Beebe, "Owls of the Nearctic Region," in *New York Zoölogical Society, Eleventh Annual Report* (New York, 1907). For superstitions, etc., consult: Brehm, *Naturgeschichte der Vögel Deutschlands* (Ilmenau, 1831; trans. into English as *Bird Life*, London, 1874); De Gubernatis, *Zoölogical Mythology* (London, 1872); Charles De Kay, *Bird Gods* (New York, 1898); and authorities cited under FOLKLORE.

OWLET MOTH. Any one of the night-flying moths of the family Noctuidæ. This is a large assemblage of moths of rather strikingly characteristic and rather uniform appearance, comprising in the United States more than 2100 species, which are almost without exception injurious to vegetation. The moths, as a rule, are of sombre colors, averaging perhaps 1.50 inches in wing expanse. The fore wings are comparatively narrow, rather short and stout, and crossed by a series of wavy lines, with two usually darker or paler spots near the centre of the wing. The hind wings are usually without markings, and when at rest are concealed by the fore wings, which overlap and cover them, either flat upon the back or rooflike. The body is large in proportion to the size of the wings. The thorax is heavy and quite stout, and in some species the scales on the upper surface are turned up, forming tufts. The abdomen is conical and extends beyond the inner angle of the hind wings when these are spread. The popular name, owlet moth, is derived from the nocturnal habits of these insects and from the fact that often when they are in obscurity their eyes shine brightly.

Some of the caterpillars are hairy, but the more typical ones are naked, and perhaps the most characteristic are the forms commonly known as cutworms (q.v.). They range from 1 inch to 1½ inches in length and have dull colors, ranging from dirty gray to dirty brown with a few longitudinal stripes. They hide during the day a little below the surface of the ground and often at the base of the plants upon which they feed, and during the night come out to eat whatever vegetation they can find. The eggs are laid on trees, stones, or leaves, and the larvæ hatch, as a rule, late in the summer, and pass the winter in a half-grown condition hidden beneath stones or logs or under the surface of the ground. In the spring they come out after this long fast and devour the new vegetation with avidity. Some of them will climb trees and are known as climbing cutworms.

The army worm (q.v.) is a famous member of this family, as are also the wheat-head army worm, the fall army worm, the cotton caterpillar of the South, and the tomato worm. The best remedy consists in ridding the land prepared for gardens before setting out the plants, by distributing here and there bunches of freshly cut grass or other vegetation which has previously been poisoned with Paris green.

Consult: Edwards, in *Standard Natural History*, vol. ii (Boston, 1884); J. B. Smith, *Manual of Economic Entomology* (Philadelphia, 1896); J. H. Comstock, *Manual for the Study of Insects* (8th ed., Ithaca, 1909).

OWL'GLASS'. See EULENSPIEGEL.

OWL PARROT. See KAKAPO.

OWN'ERSHIP. A popular term to denote the highest degree or kind of property that one can have in anything. "Owner" is often used to denote one who has such property, as contradistinguished from one who has only a partial or temporary interest in property, as lessee, tenant, licensee, bailee, or one having custody or possession. The common law knows nothing of ownership, but is concerned only with the right of possession, the remedies for the recovery of land or of goods being all possessory remedies and not aimed to determine the ultimate or fundamental right to property in dispute.

Blackstone, however, speaks of complete and partial or incomplete ownership, the former consisting in the union of title and possession in one and the same person, although in common speech one is said to be the owner who has title, although he may not have actual possession of the property. In general, one who is the owner of property has absolute control over it and the right to do with it as he will so long as he does not interfere with the legal rights of others. Consult J. P. Whittaker, *Ownership, Tenure, and Taxation of Land* (New York, 1914). See ALLODIUM; DOMINIUM; JOINT OWNERSHIP; POSSESSION, LAW OF; PROPERTY; REAL PROPERTY.

OWNERSHIP, MUNICIPAL. See MUNICIPAL OWNERSHIP.

OWOS'SO. A city in Shiawassee Co., Mich., 78 miles northwest of Detroit, on the Shiawassee River and on the Ann Arbor, the Grand Trunk, the Michigan United Traction, and the Michigan Central railroads (Map: Michigan, E 5). It is situated on both sides of the river and has a Carnegie library and several fine churches and school buildings. There are car shops and extensive manufactures of furniture, caskets, stoves, boilers, door and window screens, dining-room tables, spokes, carriages, cars, packed meats, butter, machine-shop products, hickory handles, knit goods, rugs, breakfast food, snow shovels, etc. The city is also the centre of an extensive sugar-beet industry and has a large beet-sugar factory. Settled about 1832, Owosso was chartered as a city in 1859. The government is administered by a commission of three members. The city owns and operates the water works. Pop., 1900, 8696; 1910, 9639; 1914 (U. S. est.), 10,039.

OX (AS. *oxa*, Goth. *aúhsa*, *aúhsus*, OHG. *ohso*, Ger. *Ochse*, *Ochs*, Welsh *ych*, Skt. *ukṣan*, ox, from *ukṣ*, to sprinkle, or *ukṣ*, to be strong; in the latter case ultimately connected with Gk. *ἀέξειν*, *aexein*, OHG. *wahsan*, Ger. *wachsen*, AS. *weaxan*, Eng. *wax*, to grow). The male of a bovine animal, especially one of the domestic races of cattle. The word in certain connections, as oxen or ox tribe, has come to stand for cattle in general. (See CATTLE.) An uncastrated male is a bull; a castrated male a steer, while a bull that has been castrated after reaching complete maturity is known as a stag.

OXAL'IC ACID (from Lat. *oxalis*, from Gk. *ὀξαλίς*, sorrel, from *ὀξύς*, *oxys*, sharp, acid), $C_2H_2O_4.2H_2O$. A colorless crystalline substance with an intensely sour taste. It is soluble in nine parts of cold water and much more freely in boiling water. When heated to 100° C. (212° F.) the crystals lose their two equivalents of water and the residue, consisting of the anhydrous acid, $C_2H_2O_4$, becomes opaque. The anhydrous acid may be sublimed partly undecomposed by heating gradually and carefully. When heated rapidly it decomposes into carbonic and formic acids, the latter acid further breaking up into carbon dioxide, carbon monoxide, and water. When warmed with strong sulphuric acid oxalic acid is decomposed into equal volumes of carbonic-acid and carbonic-oxide gases and water, according to the equation:

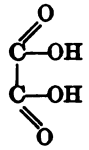
$$\underset{\substack{\text{Oxalic}\\\text{acid}}}{C_2H_2O_4} = \underset{\substack{\text{Carbonic}\\\text{acid gas}}}{CO_2} + \underset{\substack{\text{Carbonic}\\\text{oxide}}}{CO} + \underset{\text{Water}}{H_2O}$$

This reaction affords one of the best means of obtaining carbonic oxide for use in the laboratory. Oxidizing agents, such as manganese dioxide, peroxide of lead, nitric acid, etc., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese.

Oxalic acid is one of the most powerful of the organic acids and expels carbonic acid and many other acids from their salts. The acid itself and its soluble salts are poisonous. This acid is very widely diffused throughout the vegetable kingdom. Sometimes it occurs in the free state (as in *Boletus sulphureus*), but much more frequently as a salt, either of potassium, as in the different species of *Oxalis* (from which genus the acid was originally obtained and from which it derives its name) and of *Rumex;* or of sodium, as in various species of *Salicornia* and *Salsola;* or of lime, as in rhubarb and many lichens. In the animal kingdom it never occurs except in minute quantity and in combination with lime. Oxalate of calcium is found in both healthy and morbid urine and is the chief constituent of the urinary calculus known from its rough exterior as the mulberry calculus.

Oxalic acid is produced by the action either of caustic potash or of nitric acid upon many organic compounds of natural occurrence. Formerly its most common mode of preparation was by the oxidation of starch or sugar by nitric acid, a reaction that has been found to be greatly aided by the presence of traces of vanadium pentoxide. Oxalic acid has further been manufactured by heating sawdust with caustic soda at 300° C. (572° F.) in the presence of hot air or some other oxidizing agent. Still another process consists in heating sodium formate with sodium carbonate.

The molecule of oxalic acid is composed of two carboxyl groups (COOH) and is represented graphically by the following formula:



Oxalic acid.

Of the numerous oxalates the most important are the oxalate of calcium (in consequence of its physiological and pathological relations); the neutral oxalate of ammonia, which is the best test for the detection of lime in solution (in consequence of the extreme insolubility of the resulting oxalate of lime); and the acid oxalate of potassium, which is employed in various manufacturing processes, as well as for removing ink and rust stains. When the last-named salt is mixed with sulphate of iron a double oxalate of iron and potassium is produced. This compound is a strong reducing agent and has the power of separating metals (e.g., silver) from their salts; this property is made use of in photography.

The best test for oxalic acid is the production of a white precipitate (of oxalate of calcium) on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in caustic potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives a white precipitate of oxalate of silver, which explodes when heated.

The symptoms of oxalic acid poisoning are a burning acid taste, with a sense of constriction or suffocation, speedily followed by vomiting, great pain in the region of the stomach, convulsions, cold perspirations, and general collapse; respiration shortly before death becomes slow and spasmodic. With the view to converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime water, with full drafts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid. See ANTIDOTE.

OX'ALIS (Lat., from Gk. ὀξαλίς, sorrel). A genus formerly included in the family Geraniaceæ, but now referred to the family Oxalidaceæ, which includes 15 genera and about 300 species, chiefly of tropical distribution. It includes herbs and shrubs with generally compound alternate digitate or ternate, rarely simple or pinnate, leaves. As ordinarily regarded the genus *Oxalis* comprises about 200 species, natives of warm and temperate climates, particularly abundant in North America and at the Cape of Good Hope. The genus *Oxalis* has a capsular fruit and the seeds have an elastic integument, which, bursting open, projects the seed to a distance. The stems and leaves generally contain a notable quantity of binoxalate of potash and have, therefore, a sour taste. The common wood sorrel (*Oxalis acetosella*), very abundant in shady woods and groves in most parts of Europe, a native also of North America, is a beautiful little plant, often covering the ground with its green leaves, amid which the white or slightly roseate flowers appear. Its leaves all grow from the rootstock, a long leafstalk bearing three obovate leaflets, the scape a single flower. On account of their grateful acid taste, due to oxalic acid (q.v.), the leaves are used in salads and sauces. The plant is extremely abundant in Lapland and is much used by the Laplanders. The leaves of some of the species exhibit an irritability like that of the sensitive plant, generally in a slight degree, and notably only in hot sunshine, but *Oxalis sensitiva* or *Biophytum sensitivum*, an East Indian species, with pinnate leaves, possesses this property in a high degree.

VIOLET WOOD SORREL (*Oxalis violacea*).

OX'ALU'RIA (Neo-Lat., from Eng. *oxal-ic* + Gk. οὖρον, *ouron*, urine), or OXALIC ACID DIATHESIS. A morbid condition of the system, of which one of the most prominent symptoms is the persistent occurrence of an excess of crystals of oxalate of lime in the urine. Oxalate of lime is normally present in the urine, held in solution by the acid sodium phosphate. The amount excreted daily varies greatly within the limits of health, being largely increased by eating tomatoes, rhubarb, cranberries, and the like. The diet, therefore, must always be taken into account in estimating the pathological importance of an excess of the oxalates. When present in excess for a considerable period of time the condition is known as oxaluria. The accompanying train of symptoms are depression, irritability, nervous indigestion, hypochondriasis, melancholia. The cause of oxaluria is believed to be a faulty assimilation and imperfect oxidation of certain foods. It occurs in lithæmia and is thought to be related to gout. The persistent occurrence of large amounts of calcium oxalate in the urine is also of special interest because the crystals may be deposited before the urine is voided, and form the so-called mulberry calculi in the bladder or the pelvis of the kidney.

The treatment of this condition should look towards building up the general health and improving the digestion by outdoor exercise and the administration of bitter tonics and the mineral acids.

OXBIRD, or OXEYE. The dunlin (q.v.).

OX BOT. See Bot.

OX′ENBRIDGE, John (1608–74). An English nonconformist divine. He was born at Daventry, Northamptonshire. He was educated at Oxford and Cambridge, taking his degree at the latter university in 1631; was tutor of Magdalen Hall, Oxford, but was deprived of the position in 1634 for persuading the students to subscribe certain religious articles prepared by himself. He was ordained a minister of the Church of England and spent the next few years as a missionary in the Bermuda Islands. In 1641 he returned to England and preached in various places; in 1652 he was chosen fellow of Eton College, ejected in 1660, and settled at Berwick-on-Tweed, where he preached till in 1662 he was silenced for nonconformity by the Act of Uniformity. He then went as a missionary to Guiana, removed to Barbados in 1667, and in 1669 went to Boston, where he was installed in 1670 as colleague of the Rev. James Allen over the first church of that city. His publications are: *A Double Watchword* (1661); *A Seasonable Proposition of Propagating the Gospel by Christian Colonies in the Continent of Guiana* (1670); *Election Sermon* (1672); and *A Sermon on the Seasonable Seeking of God.*

OX′ENDEN, Ashton (1808–92). A British prelate. He was born at Broome Park, near Canterbury, England, the son of Sir Henry Oxenden, and was educated at University College, London. From 1849 to 1869 he was rector of Pluckley with Pevington, in Kent. In 1864 he became honorary canon of Canterbury Cathedral and in 1869 was chosen Bishop of Montreal and Primate and Metropolitan of Canada. He resigned his bishopric in 1878 because of ill health, but subsequently was vicar of St. Stephen's, Canterbury, and also rural dean of Canterbury (1879–84). Among his publications are: *The Cottage Library* (6 vols., 1846–51); *The Pathway of Safety* (1856); *The Home Beyond* (1861); *The Parables of our Lord Explained* (1864); *A Plain History of the Christian Church* (1864); *My First Year in Canada* (1871); *A Simple Exposition of the Psalms* (1872); *The Christian Life* (1877); *Counsel to the Confirmed* (1878); *Touchstones* (1884); *Short Comments on the Gospels* (1885). Consult his autobiography (London, 1891) and his posthumous *Plain Sermons* (ib., 1893), with memoir.

OX′ENFORD, John (1812–77). An English translator and dramatic writer, born at Camberwell, London, Aug. 12, 1812. He was apprenticed for the law, but he gave it up for literature. Unaided by the schools, he mastered German, Italian, French, and Spanish. From these languages he made many translations which have been highly commended. Among them are Calderón's *Vida es sueño;* Molière's *Tartufe;* Boiardo's *Orlando innamorato* (incomplete); Goethe's *Dichtung und Wahrheit* (1846) and Eckermann's *Gespräche mit Goethe* (1850). In an essay entitled *Iconoclasm in Philosophy,* contributed to the *Westminster Review,* he first made Schopenhauer known to England. Oxenford's dramatic pieces probably number more than 100. Not only were they popular at home, but several of them were translated into French, German, and Dutch. Among them are *My Fellow Clerk* (1835); *A Day Well Spent* (1835); *Twice Killed,* a farce, which was translated and played in Germany and used as a libretto (in a French rendering) for the opera *Bon Soir, Monsieur Pantalon* (Paris, 1851). In 1850 or thereabout Oxenford joined the staff of the London *Times* as dramatic critic. In 1867 he visited the United States. He died at Southwark, Feb. 21, 1877.

OXENHAM, ŏks′en-am, Henry Nutcombe (1829–88). An English theologian, born at Harrow, the eldest son of William Oxenham, an English clergyman and second master of Harrow School. From Harrow he passed to Balliol College, where he graduated B.A. in 1850 and M.A. in 1854. Ordained in the English church, he became curate of Worminghall, Buckinghamshire (1854), and of St. Bartholomew's, Cripplegate, London (1856). From the first a High Churchman, he went over to the Roman Catholic church in 1857. Subsequently he was appointed professor in St. Edmund's College, Ware, and master of the Oratory School at Birmingham. Besides contributing to periodicals he published: *The Sentence of Kaires and Other Poems* (1854); *The Catholic Doctrine of Atonement* (1865); *Dr. Pusey's Eirenicon* (1866; 2d ed., 1871); *Catholic Eschatology and Universalism* (1876); *An Eirenicon of the Eighteenth Century* (1879); *Short Studies in Ecclesiastical History and Biography* (1884); *Short Studies, Ethical and Religious* (1885). Oxenham studied for a time in Germany under Döllinger, several of whose works he translated into English.

OXENHAM, John (?–). An English novelist, educated at Victoria University, Manchester. He was for several years in business and traveled on the continent of Europe and in North America. Novel writing he took up as an amusement and carried on as a profession. Among his books are: *God's Prisoner* (1899); *Bondman Free* (1902); *Barbe of Grand Bayou* (1903), a story of the Breton coast, his greatest popular success; *Hearts in Exile* (1904); several stories of the Channel Islands, including *Carette of Sark* (1907), *Pearl of Pearl Island* (1908), *A Maid of the Silver Sea* (1910), *The Coil of Carne* (1911), and *Red Wrath* (1914); *Bees in Amber: A Volume of Thoughtful Verse* (1913); *Broken Shackles* (1914).

OXENSTIERNA, or **OXENSTJERNA,** ŏk′-sen-shâr′nȧ (often called Oxenstiern by English writers), Axel Gustafsson, Count (1583–1654). A Swedish statesman, born at Fånö in Upland, June 16, 1583. He studied at Rostock, Jena, and Wittenberg, his original interest being in theology, to which he devoted his attention. After leaving the university he visited most of the German courts, but returned to Sweden in 1603 and soon afterward entered the service of Charles IX, who, in 1606, dispatched him as Ambassador to the court of Mecklenburg. He became a Senator in 1609. He conducted with marked discretion the settlement of certain disputes between the Livonian nobles and the town of Reval, and was appointed guardian of the royal family and head of the regency when Charles became incapacitated. On the accession of Gustavus II Adolphus (q.v.) in 1611 Oxenstierna was made Chancellor. In 1613 he acted as plenipotentiary in the negotiations for peace between Sweden and Denmark, and he arranged the Peace of Stolbova with Russia in 1617. In 1621 he conducted the administration at home during the absence of the King, who was carrying on the war with Poland. Subsequently he was appointed Governor-General of the conquered district, and in 1629 concluded peace with the Poles on highly favorable conditions. For a while Oxenstierna strongly opposed the desire of Gustavus Adolphus to take part in the Thirty Years' War, but when he found that the King had determined on his course he set about collecting money and troops with energy and persistency. After Gustavus Adolphus had fairly entered on the sanguinary struggle, Oxenstierna joined him and conducted most of the extensive and complicated diplomacy which the course of events entailed on Sweden. After the death of the King, at Lützen, Nov. 16, 1632, he resolved to continue the contest with the Imperialists, in spite of the visible disaffection of many of the German Protestant princes. At the Congress of Heilbronn the states of Swabia, Franconia, and the Rhenish territories placed Oxenstierna at the head of the Evangelical League (1633). The will of the dead monarch was sent to Stockholm; according to its conditions the government, during the minority of his daughter Christina (q.v.), was intrusted to five nobles, who empowered the Chancellor to prosecute the war. His difficulties were enormous, yet he managed partly to allay the rivalries of the Protestant leaders. After the severe defeat of the Swedes at Nördlingen in 1634 Oxenstierna transferred the leadership of the Protestant forces to Duke Bernhard of Weimar and proceeded, in 1635, to France and Holland, to obtain aid against the Imperialists. Returning to Germany, he assisted in quelling a mutiny among the Swedish troops at Magdeburg, put Pomerania in a state of defense to resist the expected attack of the Elector of Brandenburg, renewed the treaty with Poland, and, leaving Banér in command of the Swedes, returned to Stockholm in 1636. In 1645 he represented Sweden at the Peace of Brömsebro with Denmark. He continued to direct ably the policy of the Protestants in Germany till the Peace of Westphalia, in 1648, put an end to the war. Oxenstierna died Aug. 28, 1654. Some treatises and historical fragments are attributed to him. Consult Geijer, *Geschichte Schwedens* (3 vols., Hamburg, 1823–36), and K. G. Styffe and others, *Rikskansleren Axel Oxenstiernas skrifter och brefvexling* (Stockholm, 1888 et seq.; vol. xv, 1909). See references under GUSTAVUS II ADOLPHUS.

OXENSTIERNA, JOHAN GABRIEL, COUNT (1750–1818). A Swedish poet and statesman. He studied under the poet and critic Olof Bergklint, served a year in the Chancellor's office, and then entered the diplomatic corps as Secretary of Legation in Vienna (1770). Returning to Sweden in 1774, he became king's chamberlain, enjoyed high favor at court and held various high offices there, being marshal of the realm from 1792 to 1801. Oxenstierna was one of the first members of the Swedish Academy on its formation in 1786. He edited the papers of King Gustavus III (1803–12) and translated Milton's *Paradise Lost* and a part of Tasso's *Gerusalemme liberata;* but he is better known for his own poetic works. *Skördarna* and *Dagens Stunder* are especially famed among his works for their beautiful descriptions of nature. In general his poetry is marked by a high order of imagination and a euphonious style, but it is not free from the pseudoclassicism of the period. His complete works were published in Stockholm (5 vols., 1805–26). Selections from his diary were edited by Stiernström (Upsala, 1881). Consult Wirsén, *Minne af riksmarskalken grefve J. G. Oxenstierna,* in the *Transactions of the Swedish Academy* (Stockholm, 1885), and M. Lamm, *J. G. Oxenstierna, en gustaviansk naturvärmares lif och dikt* (ib., 1911).

OX'EYE. 1. The dunlin (q.v.). 2. The semipalmated sandpiper (*Ereunetes pusillus*). 3. In Great Britain, the common larger titmouse (*Parus major*).

OXEYE, or DYER'S CHAMOMILE. See CHAMOMILE.

OXEYE. An ornamental plant. See CHRYSANTHEMUM; DAISY.

OXEYE BEAN. See COWAGE.

OX'FORD. A county borough and city, the county town of Oxfordshire, England, and the cathedral town of the diocese of Oxford. It is situated 51 miles by road and 64 by rail west-northwest of London, at the junction of the Isis (Thames) and Cherwell rivers (Map: England, E 5). Its chief importance is due to its university. Oxford is a place of considerable antiquity, perhaps owing its origin to the shrine of St. Friedeswide, who is said to have founded a nunnery in the eighth century on the site of the present cathedral. The origin of the name is not wholly undisputed, but it is probable that the city arms, an ox crossing a ford, correctly indicate its meaning. The word in Old English was Oxenaford, Oxnaford (ford of oxen); in Middle English, Oxneford, Oxenford; while coins of King Alfred bear the form Oksnaforda and also Orsnaforda. These coins of Alfred, indicating the existence of a mint at Oxford, testify to the prominence of the place even in his day; but the first mention in written history is in the *Chronicle* under the year 912, when it was annexed or reannexed to the West Saxon Kingdom. It came to be a place of some importance as the key to the valley of the upper Thames and in control of much of the trade of that region. It was a place of military significance and was possessed of fortifications, of which the great mound is still in existence. In 979, 1002, and 1010 it was burned by the Danes and in 1013 surrendered to Sweyn. Its increasing prominence is shown in the more and more frequent mention in the *Chronicle* as a place of meetings and treaty makings. After the Conquest it became part of the possessions of the Norman sheriff, Robert D'Oyly, who built the castle, the keep of which still remains. It was fortified with a strong wall, and became a place of much importance, especially connected with royalty. Henry I built a house or palace here (c.1130); Queen Matilda was here besieged by Stephen (1142); here both Richard I and John were born, and here was held the Mad Parliament of 1258, which enacted the Provisions of Oxford. The rise of the university attracted hither many religious orders, and for the greater part of the period before the Reformation the chief interest of the place lies in the growth and struggles of the university (q.v.). In later times the town's chief historical significance lies in the part it played in the civil wars, when for a considerable time it was not merely the centre of Royalist operations, but the capital of Royalist England. It was besieged by the Parliamentarians, but fortunately not bombarded. In the Middle Ages and even till the nineteenth century the powers conferred by the crown upon the university were prejudicial to the town.

Despite its low-lying position amid the marshes of the many-branched Thames, surrounded by hills, Oxford is a very beautiful city, owing chiefly to the presence of the collegiate and university buildings. The centre of the city is Carfax (OF. *carreforo*, a place where four roads meet), where the north and south ways (Cornmarket Street and St. Aldate's) and the east and west ways (Queen Street and High Street) meet. The city is full of interesting architecture, not only in its university buildings, though these constitute its chief adornment, but in civic and religious buildings, as well. High Street is considered by many to be one of the noblest streets in the world; along its half-mile curve stand Brasenose, All Souls, University, Queen's, and Magdalen colleges, St. Mary's Church, the modern examination schools, and other public and private buildings. The cathedral of Oxford is the chapel of Christ Church College, a Norman structure with an early English spire and a remarkable late Gothic vault. Near the eighteenth-century church of All Saints is the beautiful (modern Gothic) Martyrs' Memorial, to the memory of Ridley, Latimer, and Cranmer. The church of St. Peter-in-the-East is a Norman edifice with a crypt and with some Saxon work still remaining in its walls. The town hall is a handsome modern structure by Sir Aston Webb. For further notices of the architecture, see Oxford University. The city has much outgrown its former bounds, especially towards the north, in recent years, and is now surrounded by suburbs—North Oxford; Grandpont, on the south, reached by Folly Bridge over the Isis; Cowley, on the east, reached by Magdalen Bridge over the Cherwell; and Osney on the west. The county borough and city of Oxford has an area of 4719 acres; pop., 1901, 43,336; 1911, 53,048. The parliamentary borough of Oxford, which returns one member to Parliament, has an area of 4674 acres and (1911) 52,980 inhabitants. The university returns two members to Parliament. The city is governed by a mayor, aldermen, and councilors, forming the corporation, a high steward, a sheriff, and a recorder. The jurisdiction of the civic government, however, does not extend over members of the university. Oxford is a market town and has now some manufactures and an increasing municipal importance. See Oxford University, and bibliography there given.

OXFORD. A town in Worcester Co., Mass., 12 miles south of Worcester, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, D 4). It contains a public library, one of the oldest Universalist churches in America, and many places of historic interest in connection with the Huguenot settlement more than two centuries ago. Among the industrial establishments are woolen mills, a shoe factory, and manufactories of white flannel, etc. Pop., 1900, 2677; 1910, 3361; 1915 (State census), 3470.

OXFORD. A city and the county seat of Lafayette Co., Miss., 80 miles by rail southeast of Memphis, Tenn., on the Illinois Central Railroad (Map: Mississippi, F 2). It is most important as an educational centre, having the University of Mississippi (q.v.), the University Training School (preparatory), opened in 1905, and the city high school. There is also a Federal courthouse. Oxford has cattle, timber, and live-stock interests and, among its industrial plants, cotton gins and an oil mill. Oxford has adopted the commission form of government. Pop., 1900, 1825; 1910, 2014.

OXFORD. A town and the county seat of Granville Co., N. C., 48 miles north of Raleigh, on the Seaboard Air Line and the Southern Railroad (Map: North Carolina, D 1). It has a Masonic orphan asylum, Oxford College, and the Granville (State) Test Farm. Oxford is in the fertile piedmont section of North Carolina, the centre of extensive tobacco-growing interests. There are several tobacco warehouses and stemmeries, cotton mills, a furniture factory, an iron foundry, three carriage factories, a planing mill, a wheel-manufacturing plant, etc. The water works and electric-light plant are owned by the town. Pop., 1900, 2059; 1910, 3018.

OXFORD. A village in Butler Co., Ohio, 39 miles north by west of Cincinnati, on the Cincinnati, Hamilton, and Dayton Railroad (Map: Ohio, A 7). It is a prominent educational centre, having Miami University (q.v.) and two colleges for women—Oxford College, opened in 1849, and Western College, opened in 1855. The water works and electric-light plant are owned by the village. Pop., 1900, 2000; 1910, 2017.

OXFORD, Mad Parliament of. See Mad Parliament of Oxford.

OXFORD, Provisions of. A set of regulations drawn up in 1258 for the government of England. In that year Henry III's difficulties with his barons had come to a head, and loud complaints were made when Parliament met at London in April. Finally the King gave his consent to the formation of a committee of 24, chosen half from the royal council and half by the barons, to propose reforms. On June 11, 1258, Parliament met at Oxford, and this Mad Parliament, as it was called, caused the adoption of a new scheme of government, now known as the Provisions of Oxford. A council of 15 was selected in a complex manner, and this was to advise the King in all matters of government, and three times a year was to meet 12 representatives of the barons to discuss the whole state of affairs. This method of government lasted until 1263, with a short interruption in 1259. In 1263, however, war between Henry III (q.v.) and his barons, led by Simon de Montfort (q.v.), began. Consult Charles Bemont, *Simon de Montfort* (Paris, 1884), and William Stubbs, *Constitutional History of England*, vol. ii (4th ed., Oxford, 1896).

OXFORD, Robert Harley, first Earl of (in the Harley line). See Harley.

OXFORD MOVEMENT. The name commonly applied, from its place of origin, to the revival of the doctrines and practices of an earlier age which took place in the Church of England in the early years of the Victorian era. The movement proper, or the stage of it which is more strictly known as Tractarian, covered a period of 12 years. It began with Keble's famous sermon on national apostasy preached in St. Mary's, Oxford, in July, 1833, and closed with Newman's defection in 1845. But under other leaders the work went on, and it had its result in the modern English High Church movement. It was distinctly a revival, but of a type different from those which had preceded it in the seventeenth and eighteenth centuries.

Historically it was part of a larger movement. The beginning of the nineteenth century marked an epoch in religious thought. The deism of the preceding century, with its mechanical universe and absentee God, had induced an all-pervading deadness in spiritual things. Religion was little better than a cold morality. A reaction was inevitable. The search was for authority: the transcendental school found it in an inner light, in reason or conscience or an imaginative faith; the ecclesiastical school appealed to the authority of the Church and localized the divine in persons and places and acts. Transcendentalism saw God in man and nature; ecclesiasticism saw Him in sacraments and ordinances. In England at the beginning of the nineteenth century the church had become so thoroughly Erastian that few looked beyond the State with its civil courts for any centre of ecclesiastical authority. The most definite form of ecclesiasticism, though one little known to the great majority of Englishmen, was the Latin communion with its persistent assertion of papal claims; and over against this stood the Transcendental school with its equally persistent demand for the recognition of the individual reason. But with the birth of the Oxford movement in England came the appeal to the authority of the historic Catholic church, of which, it was contended, the national church of the country was an integral part. According to Dean Church it was not until Newman determined to force upon the public mind, in a way that could not be evaded, the great article of the creed, "I believe in one Catholic and Apostolic Church," that the movement really began. It was essentially conservative and sacramental, and opposed to the growing liberalism of English religion. Underneath the restoration of certain external requirements lay the appeal to the authority of the primitive and undivided Church. The effort was to make the national church of England more truly Catholic, not by the introduction of new features in her economy, but by the restoration of those elements of Catholicism which were already inherent, though latent, in her constitution. The movement sprang from the Catholic teaching of the Caroline divines. Its fathers were Andrewes and Laud and Cosin. It made episcopacy essential not merely to the *bene esse* but to the *esse* of the Church. The apostolic succession became a prominent plank in the platform of the Catholic school.

The doctrinal teaching may be summed up in one word—the Incarnation. This, as witnessed by Church and Scripture, was the sum and substance of the apologetic work of both the early and the later leaders of the movement. Underneath the contention as to holy orders and valid sacraments lay this basic truth of Christianity. It gave the world a living Christ, whose quickening and energizing humanity permeated the whole body of the faithful, but repudiated the idea of independent communion with him. He is to be found through the Church. He, it was held, inspired sermons, gave vitality to worship and efficacy to sacraments, and imparted energy both to individual lives and to corporate agencies for good. The sacraments were openly proclaimed as "the extension of the Incarnation."

The immediate cause of the movement was the suppression by the reform government in 1833 of 10 Irish bishoprics, coupled with the significant hint to the English prelates to "set their house in order." John Keble, professor of poetry at Oxford, had long chafed under the manifest Erastianism of the times, and what the poet had already sung in the *Christian Year* the preacher now proclaimed from the pulpit. But if Keble's sermon was the first word, the first step was taken at a meeting of a few friends at Hadleigh vicarage, in Suffolk, the home of Hugh James Rose, in July of the same eventful year. It was there decided to begin the publication of the *Tracts for the Times*, to combat liberalism by sacramentalism. The first three tracts appeared under date of Sept. 9, 1833, and during that and the following year 46 were printed and circulated among the parochial clergy. They were short but incisive statements bearing upon the polity, doctrine, and worship of the Church. In 1834 an address signed by 7000 clergymen of the English church, expressing a general adherence to her apostolic doctrine and polity, was presented to Archbishop Howley, and was followed by another of the same purport from the laity bearing the signatures of 230,000 heads of families. An association was formed by William Palmer, and a short supplement to the Catechism was prepared and published by William Perceval. But the Oxford Tracts were the motive power of the new movement and its leaders were soon known as Tractarians.

Concurrent with the issue of the Tracts were Newman's four o'clock sermons at St. Mary's. They were plain, but pointed and pungent. Men read the Tracts and listened to the sermons. An atmosphere was created and in it the urgent issues of the hour were discussed and weighed. Towards the close of 1834 Pusey joined the movement. As a professor and a canon of Christ Church, Oxford, he brought with him a name and a position. The Tracts grew into heavier and more exhaustive treatises. A translation of the early fathers was begun. The Anglo-Catholic library was started. The movement met with unexpected success and, under the leadership of Newman, Keble, and Pusey, gathered great strength in the effort to return, in doctrine and worship, to the Anglicanism of the seventeenth century.

But in 1839 a new school was formed within the movement which from that year until 1845 had a large, if not the chief, share in its guidance. It originated with William George Ward and other younger men, who came into it, as Newman afterward said, "at an angle and were sweeping the original party aside." It is said to have represented the ethical and philosophical side of the effort rather than the historical. The sympathies of its leading spirits were distinctly Roman. The vivid picture of Church authority and Catholic sanctity painted in Hurrell Froude's *Remains* fascinated many earnest and devout minds. The Protestant Reformation was represented as a deadly sin, and restoration to communion with Rome was the ideal. There was clearly a rift in the Tractarian forces. Ward's party were drifting towards the Roman Catholic church. Pusey and Keble stood firm on the original foundation. Newman was unsettled. "The large and sweeping conception of a vast and evergrowing Imperial Church," we are told, "appealed strongly to his statesmanlike imagination." Flaws and imperfections were of no account in such greatness and could be overlooked. In 1839 his sympathies were strongly Roman Catholic. He had striven to present the Church of England as holding a central historic position between a bald Protestantism on the one hand and an infallible Roman Catholicism on the other. His appeal had been to the authority of the undivided Church. But his belief in the reality of the English church was now being severely tested. While studying the Monophysite question in the summer of that year he says himself: "For the first time a doubt came across me of the tenableness of Anglicanism. I had seen the shadow of a hand on the wall. He who has seen a ghost cannot be as if he had never seen it. The heavens had opened and closed again. The thought for the moment had been, the church of Rome will be found right after all. And then it had vanished. My old convictions remained as before."

Still the movement went on, with no outward signs of failure. But with the publication of Tract 90 there came a marked change. It was written by Newman and interpreted the Articles in what Ward called a nonnatural sense. It was an attempt to show, by an ingenious application of Article XXXV on the Homilies, that the Articles were not necessarily anti-Roman. They were represented as condemning the popular exaggerations and misconceptions of Roman doctrine current at the time they were drawn up. This was enough in the temper of the times to let the storm loose. Dislike and suspicion had been seething, conspiracy and disloyalty had been darkly hinted; but with the appearance of the obnoxious Tract, claiming the right to hold Roman doctrine in the Church of England, the innate Protestantism of England flew to arms. The Tracts were stopped. Newman withdrew from Oxford to Littlemore. St. Augustine's words about the Donatists, "Securus judicat orbis terrarum," kept ringing in his ears "like words out of the sky." The ghost came again, and this time it would not leave him. The attempt to establish a joint bishopric at Jerusalem, representing both the English church and the Prussian Lutherans, pressed hard upon a sensitive and overstrained conscience. The government and the Archbishop appeared guilty of the sacrifice of principle. Then came Pusey's suspension for his sermon on the Eucharist in 1843, followed by the condemnation of Ward's *Ideal of a Christian Church* and the withdrawal of his degrees in the next year. By the summer of 1845 he and Faber and Oakeley had gone over to Rome, and in October the long-impending blow fell; Newman transferred his allegiance from the Anglican to the Latin obedience.

The catastrophe shattered the Tractarian party; it checked but it did not stop the Oxford movement. The influence of the revival had already reached far beyond the Church in England. The events connected with the Carey case in America are sufficient to show this. Arthur Carey was a graduate of the General Theological Seminary in New York and a young man of unusual promise, but he had become imbued with the teaching of the Tractarians, and a protest was entered against his ordination on the ground that he was unsound in the faith. He was, however, after the case had caused considerable excitement, ordained when he had passed a special examination by a committee of clergymen appointed for the purpose. The movement became the subject of an able and earnest debate in the American General Convention of 1844. Resolutions were adopted to the effect that the faith was already sufficiently proclaimed in the formularies of the Church, and that the canons were amply adequate to govern any cases of supposed heterodoxy. Victory seemingly rested with the advanced or Catholic school.

Another blow fell in England when the Judicial Committee of the Privy Council gave its decision in the famous Gorham case. (See GORHAM CONTROVERSY.) The court merely decided that the language used by Mr. Gorham was not so clearly contrary to the formularies of the Church as to justify the action of the Bishop in refusing to institute him; but it was understood by many people to declare that the Church of England did not teach the doctrine of baptismal regeneration. It was looked upon by the High Anglicans as a further proof of the inherent and ineradicable Erastianism of the national church. A number of clergymen sought refuge in the Roman Catholic communion, the foremost of whom was Manning. But the movement widened and went on, its work becoming more practical and less argumentative. Signs of the revival of Church life were everywhere manifest. New parishes were formed, new churches built; interest in foreign missions was aroused. Men like Dr. Hook of Leeds, Bishop Wilberforce of Oxford, Mr. Gladstone, Judge Coleridge, and Sir Roundell Palmer (afterward Lord Selborne) were found coöperating with the old and tried leaders. Doctrinal interest centred in the Holy Communion. The Real Presence and its corollary, the Eucharistic Sacrifice, were openly and widely taught and found expression in a revised and elaborate ritual. (See RITUALISM.) In 1856 proceedings were taken against Archdeacon Denison of Taunton, and in 1871 against Mr. Bennett of Frome, for teaching the Real Presence. But the result in both cases strengthened rather than weakened the position of the Catholic school. In the American church Dr. De Koven fearlessly took his stand upon the English decision in support of the doctrine of the Real Presence as coming "within the limits of the truth held in the Church of England." It has since held a recognized place in Anglican theology, and the doctrine of the Sacrifice of the Eucharist was clearly defined and ably championed by the English archbishops in their reply to the papal declaration against the validity of Anglican orders in 1897.

Bibliography. The literature of the movement is very extensive and includes some of the best biographical works in the language, among which are: R. H. Froude, *Remains* (London, 1838–39); J. H. Newman, *Apologia pro Vita Sua* (ib., 1864; new ed., in Everyman's Library, New York, 1913); J. T. Coleridge, *Life of John Keble* (2 vols., Oxford, 1869); Ornsby, *Memoirs of James Robert Hope-Scott* (London, 1884); J. B. Mozley, *Letters*, edited by his sister (ib., 1884); Mark Pattison, *Memoirs* (ib., 1885); J. E. Bowden, *Life and Letters of F. W. Faber* (new ed., ib., 1888); Wilfrid Ward, *William George Ward and the Oxford Movement* (ib., 1889); J. H. Newman, *Letters and Correspondence during his Life in the English Church*, edited by Anne Mozley (2 vols., New York, 1891); Isaac Williams, *Autobiography*, edited by Sir George Prevost (London, 1892); E. A. Abbott, *Anglican Career of Cardinal Newman* (2 vols., ib., 1892); Wilfrid Ward, *William George Ward and the Catholic Revival* (ib., 1893); R. E. Prothero, *Life and Correspondence of Dean Stanley* (2 vols., ib., 1893); A. P. Martin, *Life and Letters of Robert Lowe, Viscount Sherbrooke* (2 vols., ib., 1893); H. P. Liddon, *Life of Pusey* (4 vols., ib., 1893–97); R. W. Church, *Life and Letters of Dean Church* (ib., 1894); E. S. Purcell, *Life of Cardinal Manning* (2 vols., ib., 1895); Abbott and Campbell, *Life and Letters of Benjamin Jowett* (2

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OX'FORDSHIRE. An inland county of England, bounded north by Warwickshire and Northamptonshire, east by Buckinghamshire, south by Berkshire, from which it is partly separated by the river Thames, and west by Gloucestershire (Map: England, E 5). Area, 751 square miles. The surface is but slightly varied, level towards the north and west, undulating and fertile along the Thames valley and in the southeast, reaching an altitude of 836 feet in the Chiltern Hills. The principal rivers are the Thames, the Thame, the Cherwell, the Evenlode, the Windrush, and the Ouse. There is much forest land. The soil is fertile; agriculture is in an advanced state, a large proportion of the acreage being under crops or grass. Dairy farming is largely carried on. The manufactures, which are small, include agricultural implements, Witney blankets, bricks, paper, and gloves. Capital, Oxford. Pop., 1901, 186,460; 1911, 199,269. Consult *Victoria History of the County of Oxford*, edited by William Page (London, 1907).

OXFORD UNIVERSITY. One of the two ancient universities of England. The legendary stories of its foundation by King Alfred may be neglected; but as early as 1117 there are notices of continental scholars lecturing at Oxford, possibly attracted by the neighborhood of the palace of the scholar King, Henry I. The expulsion of foreigners from the University of Paris, as one of the results of the quarrel between Henry II and Becket, seems to have caused a definite immigration to Oxford, and the account of a visit paid to it by Giraldus Cambrensis about 1185 shows that it was already a centre of learning and possessed organized faculties with regular degrees. From this time on the university is a place of importance. In the reign of Richard I scholars were maintained there by the royal bounty, and in 1209 the academic community suffered, as it had earlier grown, by migration. This grew out of one of the frequent conflicts between students and townspeople, and had as a result the transfer of a considerable number of students to Cambridge and the rise of the schools there to the dignity of a *studium generale.* In 1214 the liberties of the university were confirmed by decision of a papal legate, which names for the first time a chancellor as a representative of the university and requires the townsmen to surrender to him or to some other representative of the Bishop any clerks whom they had seized. The distance from the see city of the diocese, Lincoln, which minimized direct episcopal control, and the prolonged struggles between town and gown, in which the university was generally successful, helped to differentiate it from the continental universities. Yet in many ways the organization of Oxford was like that of Paris, a self-governing guild of masters, presided over by a chancellor of their election. As elsewhere the earliest organization was for the purpose of limitation, not extension, of teaching; it was a trade guild, intended to supervise the qualifications of those who claimed admission to the teaching body. Like Paris and its imitators Oxford had its nations, though here there were but two—the North, including the Scotch, and the South, including the Welsh and the Irish. From the beginning the faculty of arts was of chief importance, those of law, medicine, and theology never rising to the dignity of separate deans. In the management of university affairs the congregation or assembly of regents, masters actually engaged in instruction, passed upon measures before they were submitted to the greater congregation or whole body of masters. It was a democratic society and was found on the side of independence against Henry III, who threatened such radical measures as the hanging of the whole body of students. The reform movement of Wiclif, himself a fellow and perhaps a master of a college, also found here a considerable body of sympathizers. The mention of colleges brings us to an important step in the development of the university. At first, as elsewhere, the students had lived independently at their own expense in the town. By degrees voluntary associations of students sprang up, which elected their head, rented a house, obtained a license from the university, and acquired something like a corporate existence. By the middle of the thirteenth century, too, the mendicant orders had begun to plant themselves in Oxford, as they were doing in other universities. The Dominicans came in 1221, the Franciscans in 1224, the Carmelites in 1256, and the Augustinians in 1268. They acquired property, built houses, and gained an influence among the students which soon brought them into conflict with the university authorities.

But about the same time another movement was set on foot which was destined to have more lasting consequences. This was the establishment of colleges by private benefaction for the support of students, combining the freedom of the halls with the means of support offered by the religious houses. The movement seems to have begun in Oxford and Paris almost simultaneously. In 1249 William of Durham left 310 marks for the support of 10 masters in lodgings, which were purchased by the university in 1253; this endowment grew in 1280 by the granting of definite statutes unto the oldest of the colleges, University College. Sir John de Baliol, between 1261 and 1266, laid the foundation of Balliol College by a similar gift; but the real type, which was afterward to prevail, was struck out by Walter de Merton (q.v.), who founded and gave his name to the first real college in the modern sense at Oxford. It was not, like the colleges at Paris, an association of masters of arts electing their own head but without control of the funds by which they were supported; it was governed by a warden and a number of senior fellows, who perpetuated their own body by coöptation, administered their own property, and oversaw the younger members of the college. Thus a fourth class of students came into being, besides the chamberdekyns, who lived in independent lodgings in the town, those who were inmates of religious houses, and those who lived in hostels or halls. With the foundation of colleges, often by the absorption of these older halls, came a corresponding diminution in the number of the latter, and they are now almost extinct. The tendency was towards the inclusion of all students in colleges, where discipline as well as instruction would be easier.

The fourteenth century saw the foundation of a number of these. Exeter College (1314), Oriel (1326), Queen's (1340), and New College (1379) show the importance of the movement in this century. The exhaustion of England and its demoralized condition, growing out of the Hundred Years' War and the Wars of the Roses, is revealed in the fact that only three colleges were founded in the fifteenth century—Lincoln (1427), All Souls (1437), and Magdalen (1458), in which last the system of teaching within college walls, begun by William of Wykeham at New College, was carried much further. The next century is much more prolific. Its foundations include Brasenose (1509), Corpus Christi (1516), Christ Church (planned by Wolsey as Cardinal College, but dating in its present form from Henry VIII's remodeling in 1546 and including the older Canterbury College), Trinity (1554), St. John's (1555), and Jesus (1571). There are only two in the seventeenth century, Wadham (1612) and Pembroke (1624); then almost a century passes before the transformation of Gloucester Hall into Worcester College in 1714. Keble College (1871) and Hertford in its present condition (1874, though after a checkered career, lasting from 1282) date from the nineteenth. These, with the two remaining halls, St. Mary and St. Edmund, both doomed to extinction, like New Inn Hall, which has been absorbed into Balliol, a large body of noncollegiate students, and three small private halls, include all the resident members of the university. The foundation of the colleges had a profound influence on the history and polity of the university, and their existence here and at Cambridge marks the difference between these and other universities.

To return to the general history: The new learning of the Renaissance was at first warmly received at Oxford, and all the earliest Greek students in England were Oxford men. The more conservative members of the university, known as Trojans from their opposition to the Grecians, resisted it for a time as likely to lead to heresy. The violent changes of the Reformation affected the prosperity of Oxford unfavorably. Elizabeth, however, did much to restore it, and Archbishop Laud, who was the ruling spirit there in the first half of the seventeenth century, still more. During the Civil War Oxford was more a court and a fortress than a home of study. The King resided at Christ Church, the Queen at Corpus Christi, and Parliament was held in the Divinity Schools. The university loyally contributed all its plate to the cause, and remained for long afterward strongly reactionary in its politics. Yet the attempt of James II to force a Roman Catholic head upon Magdalen was vigorously resisted and was one of the causes which contributed to his overthrow. The eighteenth century was a period of stagnation; its only striking event was the rise of the Methodists from Oxford to influence the spiritual life of the nation, as the Tractarians (see OXFORD MOVEMENT) did half a century later. The history of the nineteenth century was one of change. Two royal commissions examined the whole subject of the university system, and legislation in 1850, 1876, and 1882 especially resulted in freeing both university and colleges from the restrictions of the mediæval statutes, in restoring the university professoriate, in opening the fellowships to merit, and in relaxing the religious tests.

The constitution of the university may be most easily explained by drawing an analogy with that of the United States. It is strictly a federation, in which the colleges, with their own complete internal organization and laws, answer to the several States, while the university, with its separate officials and legislative bodies, represents the national government. Its nominal head is the chancellor, who, however, "reigns but does not govern." He is usually some great nobleman or officer of state; thus, the Marquis of Salisbury held the office for many years. The actual administrative functions are discharged by the vice chancellor, who is always the head of a college, elected for a period of four years in rotation. He is a dignified official, preceded in his public appearances by mace bearers or beadles, and still invested with many far-reaching powers; in his court are tried all cases which affect members of the university. The disciplinary functions of the university are in the hands of the proctors, two masters of arts elected annually by the colleges in turn. Their powers are also extensive, a survival of mediæval days, and extend in some particulars even over those who are not members of the university, but whom they may, for cause, forbid to reside in the town. Their surveillance, while of course it is always directed to the prevention or punishment of serious breaches of morality or order, is exercised in such minor details as the infraction of the rule which forbids an undergraduate to appear in the streets after dinner without cap and gown.

Legislative proposals are first brought up in the hebdomadal council, a body mainly of practical educators, composed of the vice chancellor, the retiring vice chancellor, the proctors, and 18 members elected by congregation, of whom six must be heads of colleges, six professors, and six members of convocation of five years' standing. This body, which, as its name implies, meets weekly, initiates legislation by framing statutes and presenting them to congregation. The latter consists, besides certain ex-officio members, of all masters and doctors who reside in Oxford 140 days in each year—some 400 or 500 in all. Statutes approved by congregation are presented to convocation, which may adopt or reject but cannot amend them. This larger body is composed of all masters and doctors who have kept their names on the books of their colleges, no matter where residing. The number amounts to some 6000 or 7000, but no large proportion of these attend except on the occasion of some burning question of theological or academic import, when stirring scenes sometimes take place. Convocation, most of whose routine business is intrusted to certain committees called delegacies, also elects the two members of Parliament which the university has returned since the reign of James I.

The examinations are conducted and the degrees granted by the university, not by the colleges. The examinations for the degree of B.A. are three in number. The first, responsions, colloquially smalls, is now in practice usually taken at or before matriculation. The second, moderations (mods), occurs after one or two years, according to whether the candidate seeks honors in it or not; and two years later comes the final examination, or greats. The degree of M.A. requires no further examination, but may be taken by any B.A. of 27 terms' standing (about seven years) from matriculation. In law, theology, science, music, letters, and medicine there are various complicated requirements, including an examination or its equivalent for the bachelor's and doctor's degrees, except in the rare cases where they are honorary. Until recent years Oxford maintained rather strictly the traditional ideal of a classical education, contrasted with Cambridge, which has always excelled more in mathematical and scientific lines; but a strong tendency has been shown of late, deeply deplored by the more conservative, to reduce the quantity of Latin and Greek required to a minimum. In moderations and finals each school or department is divided into a pass and an honor school, differing in the amount and quality of the work and the difficulty of the examinations. The degree attained is the same in each case, but in the honor schools lists of the men, divided into four classes (three in moderations), have been published since the establishment of this system in 1801.

The internal organization of each college consists of a head (variously called warden, provost, principal, president, or master) and of a number of fellows and tutors, the tutorial office being sometimes combined with a fellowship and sometimes separate from it. The officer charged with the internal discipline is known as the dean, except at Christ Church, where the dean is head both of the college and of the cathedral of the diocese of Oxford, which is combined with it. All these are known collectively and colloquially as the dons. To each undergraduate on his matriculation is assigned a particular tutor, who is supposed to take a close personal interest in him, in fact to stand *in loco parentis* during his residence; a man's own tutor, however, need not have anything directly to do with his studies, unless he happens to take up the branch in which the tutor gives instruction. Formal teaching is chiefly by means of lectures, which are supplied usually by the college or by combinations of colleges. The exception is the lectures of the professors, who are university functionaries and whose lectures are public. At these lectures, of which two, three, or four may be attended in a morning, the undergraduate is supposed to take full notes to which he may refer afterward. Except an occasional request to construe a passage of a Latin or Greek author in a man's first year, there is scarcely any approach to what are known in America as recitations. The instruction given in the lectures is supplemented by individual instruction given by the tutors of the college, especially by means of essays, which the student writes on his subject and the tutor corrects. Beyond this a man is supposed to read for some hours each day, at his own discretion. This freedom is a characteristic feature of the Oxford and Cambridge system. It is tempered by a college examination known as collections at the end of each term; this has no effect on the obtaining of a degree, but is intended simply to give the college authorities an idea of how a man's work is progressing.

The afternoon is devoted by most undergraduates to athletic exercise of one sort or another, interest in which forms a normal part of the life. Distinctions won in this way—the right to wear the blue, the university color which denotes that the wearer has represented the university in cricket, football, rowing, etc.—are as eagerly coveted as a double first in the schools. In the evening the whole college assembles in the hall for dinner, the dons sitting at the high table on a sort of dais. Breakfast and lunch are taken in a man's own sitting room. The evening is spent as he pleases, except that if he is residing in college he is absolutely required to be within the college gates before midnight. If he does not intend to read he will pass the evening in visiting or entertaining his friends or in attending the meetings of the innumerable societies which exist, devoted to every conceivable interest, literary, scientific, musical, or purely social. Of these the most famous is the Union Society, which combines all the conveniences of a London club with the holding of regular debates in which many of the most famous public orators of England, from Mr. Gladstone and Lord Salisbury down, have received their first training. In fact, it may be considered one of the essential characteristics of English university life that there is no strict line of demarcation drawn between it and the after career of the student. The elasticity of the system adapts it to the requirements of very varied types of men, and the undergraduate who expects to enter political life or to become a mere country gentleman may profit by the discipline of life and the atmosphere of general culture while a man who seeks for the attainment of advanced scholarship can easily get all the help he needs. The existence side by side of the pass and honor schools constitutes a distinct disavowal of the system of Procrustes.

The prevalent religious tone of the university is still one of attachment to the Church of England, in spite of the relaxation of the strict requirements of past days. The services in the college chapels are those of the Prayer Book; attendance on them a certain number of times in each week is still usually compulsory, though in some colleges a roll call at an early hour in the morning is allowed to take the place of the prayers. Since the throwing open of the university Mansfield College for Congregationalists and Manchester College for Independents have been founded, as well as more recently a hall for Roman Catholic students. None of these, however, has any corporate connection with the university. Other institutions which have an influence upon the spiritual life of undergraduates are the Pusey House (see PUSEY) and St. Stephen's House, the latter intended primarily as a training school for Church of England missionaries. Outside of the colleges proper there is also a considerable body of unattached students, who are members of the university without belonging to any college or hall. They are under the general supervision of an official known as the censor of unattached students. This class was admitted first in 1858. The total number of undergraduates is generally over 3000. Since 1884 women have been allowed to share the instruction, though not to matriculate or take degrees. They occupy two houses, Somerville and Lady Margaret halls.

The architecture of the university buildings is extremely interesting. No other educational centre, unless it be Cambridge, can vie with Oxford in the antiquity, dignity, beauty, and picturesqueness of its buildings. These represent three distinct periods, the mediæval, the Renaissance of the seventeenth and eighteenth centuries, and the modern, and comprise the various college quads or quadrangles, the chapels, and buildings for special purposes such as libraries, museums, assembly halls, etc. The oldest buildings are the university church (St. Mary's), of the thirteenth century, with a fine spire and a curiously picturesque baroque porch; Christ Church chapel (1180), with a superb late Gothic lierne vault; and the oldest parts of Merton and St. John's colleges. Merton College Hall dates from 1310. New College was built in 1386. The fifteenth century was a period of great activity. The Divinity School, the Schools, the Bodleian Library, All Souls, and the beautiful quadrangles and tower of Magdalen College were built in that century. These exemplify the fully developed English collegiate Gothic at its best, although the early sixteenth-century work—chiefly additions and extensions, as in the beautiful hall of Christ Church—is hardly if at all inferior, and in richness of detail surpasses the earlier work. In the seventeenth century the Elizabethan and Jacobean Renaissance appears, in Wadham, Queen's, University, and Oriel colleges, St. Mary's porch and the later portions of the great quad of Christ Church. The noble domical Radcliffe Library, by Gibbs, and the Sheldonian Theatre, by Wren, are the chief contributions of the eighteenth-century Palladian style; while among those of the nineteenth century Sir Gilbert Scott's beautiful chapel for Exeter College is undoubtedly the finest example. In general the modern college buildings (of Merton, Christ Church, Balliol, and Keble colleges) and the new museum are of inferior interest; the majority are in a modern version of the collegiate Gothic, but a few are in a modern English Renaissance style.

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OX GALL. The bile of the ox, greenish yellow in color. It has several uses in the arts and manufactures. It is an excellent cleansing agent on account of the abundance of soda in its composition, which gives it a soapy quality, and is used for scouring wool and other purposes. It is reduced to the form of an extract for preservation, and is dissolved in alkaline water for use. Its chief employment is in mixing colors, especially in water-color painting, the effect being to give them tenacity and fluidity. It is also an ingredient in varnish, is a substitute for India ink, and is used in painting on ivory. Purified ox bile, *fel bovinum purificatum*, is prepared by mixing the liquid with twice its volume of pure alcohol. On standing 12 hours the clear liquid is decanted and evaporated to the consistency of pill mass and rolled into pills, which are subsequently coated with keratin to prevent disturbance of gastric digestion. Ox bile is administered when the natural secretion is scanty or absent.

OX'GANG'. See Bovate.

OX'IA'NA, Lake of. The ancient name of a lake in Asia. See Aral.

OX'IDASE (from Gk. ὀξύς, *oxys*, sharp, quick, acid). The name of a group of enzymes which activate free oxygen and cause thereby the oxidation of a great variety of substances. The ones best known are those causing the oxidation of various aromatic compounds (guiaconic acid, guaiacol, hydroquinone, phenolphthalein, tyrosine, etc.) and frequently producing pigments. Laccase and tyrosinase are the two best-known plant oxidases. Laccase was first found in the sap of the lac tree (*Rhus vermicifera*). It oxidizes certain constituents of the milk of this tree, yielding a black varnish. The enzyme will oxidize a large number of other aromatic compounds, such as guiaconic acid. It, or very similar oxidases, is of rather general distribution in all groups of the plant kingdom. Tyrosinase causes the oxidation of tyrosine and related compounds, first to red and then to black pigments. This is the cause of the blackening of the toadstool *Russula nigricans* with age, and of the cut surfaces of roots and tubers of various plants, such as beet, potato, dahlia, when they are exposed to the air. Tyrosinase is involved in the production of the melanin pigments of the hair, feathers, and skins of various animals, and is very abundant in the meal worm. Several other groups of oxidizing enzymes have been studied in plants or animals or both. The aldehydases oxidize aromatic aldehydes and related substances. The purine oxidases include a large group of specific oxidases, studied mainly in animals, which transform quanin, adenine, xanthine, hypoxanthine, etc., with the final production of uric acid. There are enzymes which oxidize sugars and their fermentation products, but our knowledge of these is rather limited.

Peroxidases are another group of oxidizing enzymes of even wider distribution in plants than are oxidases. They differ from the latter in that they activate the oxygen of a peroxide, such as hydrogen peroxide, instead of free oxygen. The action of peroxidase is well shown by the production of guiacum blue when it and a little hydrogen peroxide are added to guiaconic acid. Peroxidases will endure much higher temperatures than oxidases, and may be freed from the latter by heating. The fruit of the pumpkin and the root of the horseradish are very rich in peroxidase, and they have been much used as the source of the enzyme. Catalases are another group of oxygen catalysts of almost universal distribution in living cells. They decompose hydrogen peroxide into water and oxygen. This is the cause for the effervescence when the peroxide is applied to a sore. We know nothing certainly of the function of catalase in the organism. There are a number of substances (perhaps some of them are enzymes) that bring about reductions in the living cells. These have been included under the term "reductases." One of these bodies that forms nascent hydrogen has been called hydrogenase. Its activity is well known by the production of sulphureted hydrogen when flowers of sulphur are placed in a yeast culture.

These bodies are very intimately connected pigment productions in plants and animals. It is known that many of these are formed by the oxidation of colorless chromogens, and in the case of anthocyanin there is some evidence that it is produced by the reduction of a chromogen. There is no doubt that these substances have a chief rôle to play in fermentation and in respiration of plants and animals, although here our knowledge is rather meagre, except perhaps for the oxidation of the purine bodies which are mentioned above.

Consult: Vernon, *Intracellular Enzymes* (London, 1908); Kastle, "The Oxidases and Other Oxygen Catalysts Concerned in Biological Oxidations," in *Hygienic Laboratory, Bulletin No. 59* (Washington, 1910); Dakin, *Oxidations and Reductions in the Animal Body* (New York, 1912).

OX′IDES (from Gk. ὀξύς, *oxys*, sharp, quick, acid). A term applied to a variety of compounds of oxygen, but more especially to those in which oxygen is combined only with a metal or a metalloid. The principal classes of oxides are the basic or metallic oxides and the acid oxides or acid anhydrides. Lime, the oxide of calcium, is an example of oxides of the first class. Sulphur trioxide, or sulphuric anhydride (SO_3), is an example of oxides of the second class. An oxide of one class as a rule combines readily with an oxide of the second class to form a salt. Thus, lime combines with sulphur trioxide to form calcium sulphate. Oxides are frequently prepared by the direct union of oxygen with other elements. Many of the metallic oxides are formed by the action of heat on carbonates, nitrates, and other salts of volatilizable acids. The metallic oxides occurring in nature are among the most abundant and valuable ores.

OX′LEY, James Macdonald (1855–1907). A Canadian author, born at Halifax, Nova Scotia. He graduated B.A. from Dalhousie University in 1874 and subsequently studied at Harvard. Called to the bar in 1878, he practiced in his native city for five years and then became legal adviser to the Department of Marine and Fisheries at Ottawa. During this period he edited *Nova Scotia Decisions* (1880–83) and Young's *Admiralty Decisions* (1882). He resigned his position in 1891 and in 1892 he became manager of the Sun Life Assurance Company at Montreal. Before leaving Ottawa Oxley had begun his long series of books for boys, among which are *Bert Lloyd's Boyhood* (1887); *Up among the Ice Floes* (1890); *The Chore Boy of Camp Kippewa* (1891); *Donald Grant's Development* (1892); *Diamond Rock* (1893); *Archie McKenzie, the Young Nor'wester* (1894); *In the Wilds of the West Coast* (1894); *On the World's Roof* (1896); *In the Swing of the Sea* (1897); *Fife and Drum at Louisbourg* (1899); *Lhasa at Last* (1900); *The Family on Wheels* (1903); *North Overland with Franklin* (1907).

OX′LEYA (Neo-Lat., named in honor of John Oxley, an Australian explorer in the nineteenth century), or Flindersia. A genus of trees of the family Rutaceæ, of which one species, *Flindersia oxleyana*, the yellowwood of eastern Australia, often attains a height of 100 feet. Its timber is valued for boat building, for cabinetwork, and for other purposes where an ornamental wood is desired. It is quite resistant to attacks of termites, an important consideration in tropical countries. A yellow dye is obtained from the tree. See Flindersia.

OX′LIP′. An ornamental plant. See Primula.

OXNARD, ŏks′närd. A city in Ventura Co., Cal., 66 miles by rail northwest of Los Angeles, on the Southern Pacific and the Ventura County railroads (Map: California, F 8). It contains a public library and there are machine and woodworking shops and a large beet-sugar factory and refinery. Oxnard is the centre of a great lima-bean industry. The water works are owned by the city. Pop., 1910, 2555.

OX′OZONE, O_4. An allotropic modification of oxygen. (See Ozone.) In 1906 Ladenburg and Lehmann obtained spectroscopic evidence of the existence in liquid ozone of a form of oxygen having a higher molecular weight than ozone. This conclusion was confirmed and the existence of oxozone was placed beyond doubt by Harries and his pupils in 1912, these investigators having conclusively shown that unsaturated organic compounds, when acted upon by ordinary ozone, yield not only the corresponding ozonides (q.v.) but also a series of oxozonides. For example, butylene, C_4H_8, yields not only the ozonide $C_4H_8O_3$ but also an oxozonide of the formula $C_4H_8O_4$. Ozone may be freed from the oxozone which it almost invariably contains by washing with caustic potash or sulphuric acid, and when so washed ozone is no longer capable of yielding oxozonides. On the other hand, when liquid ozone is partially vaporized the oxozone accumulates in the residual liquid. But pure oxozone has not yet been obtained, and its physical properties are, therefore, unknown.

OX′PECK′ER, or Buffalo Bird. Any of several starlings or starling-like birds which gather about cattle and pick the parasites from their hides or feed upon the insects which they disturb in the grass. The name more especially belongs to a South African species (*Buphaga africana*), which seeks the company of the wild buffalo, and nowadays of tame cattle, and picks the ticks from their hides. Another species (*Buphaga erythrorhyncha*), distinguished by its red bill, performs the same service for the rhinoceros, and is commonly called rhinoceros bird. Similar birds with similar habits are known in the Orient as buffalo birds, and belong to the large genus *Sturnopastor*. Similar habits belong to the American cowbirds (see Cowbird). Cf. Buffalo Bird; and see Plate of Larks and Starlings.

OX'US. The ancient name of the Amu (q.v.).

OXWARBLE. See Bot; Warble Fly.

OX'YACET'YLENE WELDING AND CUTTING. The process of welding or cutting metal by means of an acetylene flame raised to a high temperature (3500° F.) by oxygen conveyed to a burner or torch with a suitable combining nozzle. This process is one of those known as autogenous welding, where the metals to be joined are melted at their edges rather than being merely softened as in ordinary welding (q.v.), where complete union is accomplished by hammering. For oxyacetylene welding the acetylene is commonly supplied in steel cylinders containing porous materials such as asbestos, curled hair, etc., or acetone, in which acetylene is soluble, as the gas cannot safely be transported in bulk as may be done with oxygen and other gases. In many establishments a special plant for the production of acetylene is installed and the gas piped to all parts of the works as convenience requires. See Acetylene.

The process of oxyacetylene welding was first suggested by Le Chatelier in France about 1895, shortly after the production of calcium carbide in the electric furnace (q.v.), and the first welding equipment for factory use was introduced into the United States from France in 1905. It was found extremely useful, and iron, steel, aluminium, copper, and the bronzes now are welded in a highly satisfactory manner. All these metals with the exception of cast iron can be cut successfully and with greater rapidity and convenience than by machine methods. Cast iron, however, is not susceptible to this treatment, as the free carbon it contains seems to prevent the torch flame penetrating the metal to the desired degree. In operation the acetylene is ignited first and then the oxygen valve opened and the quantity of each gas regulated so as to produce a flame of the highest attainable temperature. The two gases are commonly used at pressures ranging from 3 to 12 pounds per square inch. The pieces of metal to be welded are prepared by scraping and cleaning the edges and then the torch, with a nozzle or jet appropriate for the special kind of work or material, is applied in such a manner as to heat the portions of metal adjacent to the weld and thus distribute the thermal strains and prevent subsequent cracking. The operator holds the torch in one hand and moves it away from him as he works, at the same time applying with his other hand a slender rod of metal, called a "melt stick," which he holds in the flame of the torch and which by its fusion supplies the necessary material for filling the space between the edges to be joined.

Oxyacetylene welding is used for a great variety of repair work, as the simplicity and compactness of the apparatus make it adaptable to any locality or position. In automobile repair shops, for locomotive and machine repairs, as well as those required to be done in shipyards, the process is the quickest and cheapest, as it usually avoids the costly dismantling of engines and machinery inseparable from older methods. High-pressure water-pipe lines giving trouble constantly by leakage at riveted joints can be made tight by such welding, and in a number of cities gas mains have been laid and connected exclusively by welded joints, securing not only better but cheaper construction.

Cutting metal with the oxyacetylene flame is so rapid and economical a method both for the shop and in the field, that in some establishments it has entirely superseded machine cutting. With a fine jet of flame of intense heat the metal is quickly burned through with a narrow and even cut, the material being melted and volatilized in a shower of brilliant sparks. The method is particularly useful in wrecking structural steel, reducing old boilers and tanks to scrap, etc.; and when applied to work usually done with a machine tool large pieces can be gotten out in much less time than would be required to set the work and adjust the cutters of a planer or shaper.

Bibliography. L. A. Groth, *Welding and Cutting Metals by Aid of Gases or Electricity* (New York, 1909); R. N. Hart, *Welding: Theory, Practice, Apparatus and Tests, etc.* (ib., 1910); "Symposium on Welding," in *Journal of the American Society of Mechanical Engineers* (ib., 1914); "Fusion or Autogenous Welding," in *Bulletin of the Society of Automobile Engineers* (ib., 1914); C. F. Swingle, *Oxy-Acetylene Welding and Cutting* (Chicago, 1915).

OXYACIDS, or Hydroxy Acids. A term applied by organic chemists to carbon compounds that are at once acids and alcohols, i.e., acids whose molecules contain one or more hydroxyl groups (OH) attached to a hydrocarbon radicle. (See Alcohols.) Thus, oxyacetic acid, or hydroxyacetic acid, known as glycollic acid, has the constitutional formula $CH_2(OH).COOH$.

OX'YÆ'NA (Neo-Lat., from Gk. *ὀξύς*, *oxys*, sharp, quick, acid). A fossil creodont mammal from the Wasatch Lower Eocene beds of the western United States. See Patriofelis.

OX'YLCHLO'RIDE OF CARBON. See Phosgene Gas.

OX'YGEN (from Gk. *ὀξύς*, *oxys*, sharp, quick, acid + *-γενής*, *-genēs*, producing, from *γίγνεσθαι*, *gignesthai*, to become). A gaseous element isolated by Priestley in 1774. Priestley's classical researches in pneumatic chemistry led him to the discovery that when red mercuric oxide is heated by the sun's rays it decomposes into a colorless gas, which he called dephlogisticated air, and metallic mercury. Somewhat earlier, perhaps, Scheele, in Sweden, independently discovered oxygen, giving it the name of empyreal air. Shortly afterward Condorcet suggested the name of vital air. Lavoisier, however, was the first definitely to establish the true character of oxygen, and it was he who first gave it its present name. See Chemistry.

Oxygen exists uncombined in the atmosphere to the extent of 21 per cent by volume and more than 23 per cent by weight. In combination, too, it is very abundant in nature, forming eight-ninths by weight of all water and a considerable percentage by weight of silica, alumina, and chalk, which are the three most abundant and widely distributed constituents of the earth's crust. It is, further, a normal component of nearly every rock and mineral and of all animal and vegetable tissues and fluids.

It is absorbed in large quantities from the atmosphere by animals and vegetables in the process of respiration, but plants also evolve it under the influence of sunlight. Oxygen may be readily prepared by heating red mercuric oxide, by heating manganese dioxide to a red heat, or by heating potassium chlorate to 370° C. (about 700° F.), or, finally, by heating a mixture of potassium chlorate and manganese dioxide. Commercially it was long made by heating manganese dioxide, either alone or together with potassium chlorate. The alternate formation and decomposition of alkaline manganates was originally proposed in 1866 by Tessie du Motay as a process of manufacturing oxygen for illuminating purposes. The process has been successfully employed in Europe and the United States. More recently the alternate formation and decomposition of barium peroxide has been taken advantage of for the commercial production of oxygen. This method, which was chiefly developed by the brothers Brin, consists in heating barium oxide to a dull red heat in a current of air, whereby it is converted into barium peroxide, which at a still greater heat is decomposed again into barium oxide and free oxygen. This economic process has been worked on a large scale in various places. But since the early years of the twentieth century oxygen has been chiefly manufactured by the Linde process, which consists in liquefying air and subjecting it to fractional distillation by means of a suitable rectification column (see Distillation), which readily yields an oxygen that is 98 or 99 per cent pure. To a much less extent, at present, oxygen is manufactured by the electrolysis of water.

Oxygen (symbol, O; atomic weight, 16; see Atomic Weights) is a colorless, odorless, and tasteless gas which has been condensed to a pale steel-blue, transparent liquid, boiling at —181.4° C. and freezing to a white solid at —235° C. Compared with air as unity, oxygen has a specific gravity of 1.1504, and it is the least refractive of all gases. Oxygen is slightly magnetic, which property is diminished or temporarily suspended by elevation of temperature. When examined through thick layers oxygen has a bluish tinge of color. It combines directly with most of the elements. (See Oxides.) It is sparingly soluble in water, and nearly all natural waters contain oxygen in solution, which can be completely removed by boiling in vacuo. This dissolved oxygen is necessary to sustain the life of fish. In the pure state oxygen may be inhaled, for a time, with impunity, and it even acts as a tonic or exhilarant. Its long-continued respiration, however, is harmful. In pure oxygen bodies burn with much greater brilliancy than in common air. See Combustion.

Oxygen has been used successfully to maintain air in a respirable condition, as in diving bells, submarine vessels, etc., and its use has been suggested for the revivifying of the atmosphere in public halls. It finds extensive application, in connection with hydrogen or illuminating gas, in the production of the oxyhydrogen flame. (See Drummond Light; Oxyhydrogen Blowpipe.) It is also used in the bleaching of paper pulp, in the oxidation and thickening of oils which are used in the manufacture of varnish and oilcloths, for the purpose of hastening the maturing of spirits or liquors, and in the manufacture of vinegar. But by far the most extensive use of oxygen at the present time is, in connection with the oxyacetylene flame, for welding and cutting metals. Consult: Jörgensen, *Die Entdeckung des Sauerstoffes* (Stuttgart, 1909); F. G. Benedict, *Composition of the Atmosphere, with Special Reference to its Oxygen Content*, published by the Carnegie Institution (Washington, 1912); Georges Claude, *Liquid Air, Oxygen, Nitrogen* (Philadelphia, 1913). See also Ozone.

OXYGEN, in Medicine. Oxygen is widely used, both in medical and surgical practice, in three ways—by the inhalation of the gas itself, by drinking oxygenated water, and by means of peroxide of hydrogen. It has also been injected into the abdominal cavity after operations, to prevent adhesions and to stimulate the patient. When employed as a gas oxygen is liberated slowly from a cylinder containing it under strong pressure and inhaled. In this form it is given in all conditions where there is interference with respiration. In the later stages of pneumonia, when there is danger to life from deficient aëration of the blood, in the chronic bronchitis of old people, and for the resuscitation of victims of coal-gas asphyxiation, oxygen gas is of very great value. It will allay the oppression and dyspnœa in phthisis and other wasting diseases. It acts as a direct stimulant to the respiratory mucous membrane and has a beneficial effect on the heart and respiration. When prolonged anæsthesia is necessary, oxygen is often given in conjunction with the general anæsthetics, to relieve cyanosis and as a safeguard against cardiac or respiratory failure. A mixture of nitrous-oxide gas and oxygen constitutes one of the safest general anæsthetics known. The use of oxygen in medicine is due to the valuable opinions and demonstrations of Dr. A. H. Smith, of New York. See Hydrogen Dioxide.

OXYGENATED WATER. See Hydrogen Dioxide.

OX'YHY'DROGEN BLOWPIPE, or Compound Blowpipe. An apparatus by means of which hydrogen is burned in pure oxygen, the flame having an exceedingly high temperature. This apparatus, invented by Dr. Robert Hare, of Philadelphia, in 1801, and originally called a hydrostatic blowpipe, may be used for fusing highly refractory substances. According to Bunsen a temperature of 2844° C. (5151° F.) is obtained when a jet of oxygen gas is brought within the flame of hydrogen gas. A watch spring held in such a flame, which is almost colorless, burns with bright scintillations, and platinum can be boiled by means of the flame. (See Drummond Light.) The oxyhydrogen blowpipe has been superseded by the oxyacetylene burner. See Oxyacetylene Welding and Cutting.

OX'YRHYN'CHUS. The ancient Greek name of a town in Egypt, which has acquired importance because of the valuable papyri found in its ruins. See Bahnasa. For the sayings attributed to Jesus in papyri found there, see Agrapha; Grenfell, Bernard Pyne; Hunt, Arthur Surridge; Paleography.

OXYTO'CICS (from Gk. *ὀξυτόκιον*, *oxytokion*, medicine to facilitate quick delivery, from *ὀξύς*, *oxys*, sharp, quick, acid + *τόκος*, *tokos*, birth). Remedies which increase uterine contractions. The chief drugs of this class are ergot (q.v.) and quinine (q.v.). Ergot is the most widely known and used oxytocic, and was formerly employed to hasten labor. It should never be given until the uterus has been emptied. In this way it is frequently given after labor, to cause contraction of the uterus. Pituitary extract is now much used to stimulate uterine contractions and hasten labor, but authorities are divided as to its value and possible danger.

OXYURIS, ŏk′sĭ-ū′rĭs (Neo-Lat., from Gk. *ὀξύς*, *oxys*, sharp, quick, acid + *οὐρά*, *oura*, tail). A nematode worm belonging to the Ascaridæ and characterized by a fusiform shape and a rounded oval aperture. The variety *vermicularis* is the threadworm found in the sigmoid flexure and in the rectum of human beings. In horses this worm is called the bot. The male is ⅛ inch, the female nearly ½ inch in length. See ANTHELMINTIC.

OYAMA, ō′yä′mȧ, IWAO, PRINCE (1842–). A Japanese soldier, born at Kagoshima, a samurai of the Satsuma clan. In 1869 he was sent to Europe to study the tactics of the Franco-Prussian war, and afterward went several times on official missions. He fought on the Imperial side in the civil war of 1877, became lieutenant general in the following year, and was made general in 1891. He was appointed Minister of War in 1885. In the war with China he led the Second Army, which took Port Arthur, Kinchow, and Wei-hai-wei. In 1882 he became chief of the general staff, and received the title of field marshal in 1898. In 1904 he became commander in chief of the Japanese armies operating against Russia in Manchuria, where he arrived in time to direct the battles of Liao-Yang, Shaho, and Mukden. The success of the Japanese armies was largely due to Oyama's remarkable knowledge of tactics. (See RUSSO-JAPANESE WAR.) He received the British Order of Merit in 1906 and was created Prince in 1907. His wife was educated in America.

OYER, ō′yẽr (AF., to hear). A term employed in common-law pleading to signify a demand by one party to an action to have read or produced for inspection a document to which the other party refers in his pleadings. Originally where a party based his claim or defense upon a deed, upon letters testamentary or letters of administration, he was obliged to "make profert" of the instrument, i.e., allege that he produced it in court, whereupon the other party might "crave oyer," i.e., demand to hear it read, in order that he might avail himself of its contents in his pleadings if he deemed it advisable. At a later date, instead of having it actually read in open court, the party making profert was required to give the opposite party a true copy of the instrument.

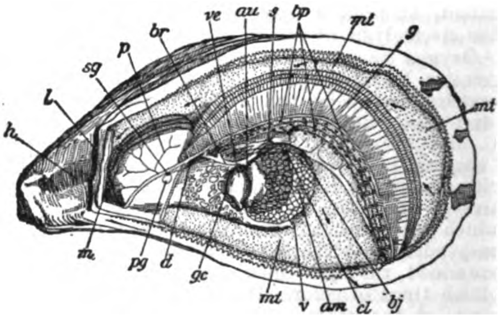
In England and most of the United States the practice of requiring a pleader to make profert has been abolished, and with it the practice of demanding oyer, and instead a party referring to an instrument in a pleading is required to annex a true copy thereto or, upon written demand, to supply such copy to the opposing party. See DISCOVERY; EVIDENCE; PLEADING.

OYER AND TER′MINER (AF., to hear and to determine). In English law, a commission under the King's great seal appointing certain judges to hear and determine criminal causes in and for designated circuits. This commission was very ancient in its origin. Before the Judicature Acts (q.v.) the commissioners, as the judges so appointed were called, constituted the Court of Oyer and Terminer. The above Act vested in the High Court of Justice all the powers formerly exercised by the Court of Oyer and Terminer, but its jurisdiction of criminal offenses is still dependent upon such a commission. A special commission is sometimes issued authorizing the judges to try certain designated criminal cases out of the regular term.

The highest court of criminal jurisdiction in the State of New York was formerly known as the Court of Oyer and Terminer, but it derived its jurisdiction from the statutes creating it and not from a commission as was the case in England. It has been merged in the Supreme Court by the constitution.

OYEZ, ō′yez (AF., OF., hear ye). The expression formerly employed by court officers or criers in announcing the opening of court. It was introduced into England by the Normans, together with other legal expressions and forms. In the United States the English translation, "hear ye," is still employed by most court criers in announcing the opening of court.

OY′STER (OF. *oistre*, *ouistre*, *huistre*, Fr. *huître*, from Lat. *ostrea*, *ostreum*, from Gk. *ὄστρεον*, *oyster*; connected with *ὀστέον*, *osteon*, Lat. *os*, bone). A sessile bivalve mollusk of the family Ostreidæ, especially any of the numerous species, extinct and extant, of the genus *Ostrea*. The shells are irregular and unequal; the fixed left valve generally spacious, strongly convex without and excavated within; right valve generally plane or concave externally, always less convex than its fellow; both shells beaked; ligamental area elongate or triangular; hinge toothless; adductor impression single and shell subnacreous. The oyster of the eastern coast of the United States is *Ostrea virginica*, a valuable species of protean characters, formerly much subdivided by systematists and almost impossible to diagnose. The shells are lateral and hinged anteriorly, an elastic pad (ligament) causing them normally to gape. Closely applied to their inner faces and extensible beyond their margins are two thin folds (mantle) of the body wall, which secrete the shell in successive layers within and on the margins. The mantle incloses a chamber (mantle cavity) open ventrally and posteriorly, into which project on each side a pair of gills, commonly called the beard, and in front of these a pair



ANATOMY OF OSTREA VIRGINICA.

h, hinge; *l*, ligament; *d*, *pg*, and *sg*, connective, and two ganglia of the nervous system; *p*, palps; *br*, blood-vessel from gills to auricle of heart; *au*, auricle; *ve*, ventricle; *s*, external opening of sexual and renal organs of right side; *bp*, pores from which the water issues into the branchial canals after passing through the gills; *mt*, mantle (the arrows showing the direction of currents produced by cilia); *g*, gills; *gc*, cavity between the two mantle folds; *cl*, cloaca; *am*, adductor muscle (cut across); *bj*, outline of organ of Bojanus, the so-called kidney.

of smaller fleshy lobes (palps). Above the gills and palps lies the body, containing the digestive, reproductive, circulatory, excretory, and nervous systems and the adductor muscle which closes the shells. The adductor (popularly the eye or heart) lies somewhat behind the middle of the body, the dark scars on the inside of empty shells marking its attachments. The funnel-shaped mouth lies between the two pairs of palps. A short gullet leads into a spacious stomach, and this into the tubular intestine, which opens by an anus above the adductor. Surrounding the stomach is the liver, a large dark-green digestive gland opening into the stomach by numerous ducts. In front of the adductor lies the pericardium, containing the two-chambered heart and in proximity to the excretory organ. The simple degenerate nervous system consists of two pairs of ganglia, one above the gullet and the other beneath the adductor, connected by a pair of nerve cords.

The sexes are separate, but without external distinction. The sexual glands when ripe are creamy white organs surrounding the digestive system and opening on each side beneath the adductor. In Long Island Sound spawning occurs from May to August, in Chesapeake Bay from April to October, in South Carolina as early as March, and in Florida as early as February. In oysters transplanted during the spawning season reproduction is often interfered with or arrested. An average oyster will produce 16,000,000 eggs and a very large one 60,000,000. When ripe the sexual products ooze from the genital openings and fertilization results from their accidental meeting in the water. Segmentation results in five or six hours in the production of a ciliated gastrula, a cup-shaped, free-swimming organism, often carried by the currents to found new and remote beds. An embryonic shell soon appears, and the little oyster sinks to the bottom, where, if favorably situated, it becomes attached by its left valve and gradually assumes the adult form. The recently attached spat is $\frac{1}{80}$ to $\frac{1}{50}$ of an inch in diameter, and its subsequent growth varies with its environment. Single oysters on firm bottom become round and deep, but those in clusters or on soft bottom grow irregular and elongate. On undisturbed natural beds they grow in clusters, and the beds repose, as a rule, on a muddy substratum upon which they have been built up from a comparatively small nucleus by the fixation, year after year, of the young upon the shells of their predecessors.

Oysters live from above low-water mark to a depth of 15 fathoms, where the density is between 1.002 and 1.025, the optimum being from 1.011 to 1.022, and in a range of temperature which in Chesapeake Bay extends from 32° F. to 90° F. The embryos and fry require more equable and stable conditions, the temperature required being between 68° and 80° F. The best and most productive beds are commonly in strong tidal currents, which disseminate the fry and food and keep the old shells clean enough to catch the spat. Diatoms constitute about 90 per cent of the oyster's food, the rest consisting of other small plants and animals and in the breeding season of its own eggs and fry. The latter are eaten by other mollusca also, and from its attachment until it reaches a large size the oyster is preyed upon by starfish, drills (*Urosalpinx*), drumfish, rays, and other aggressive enemies, while it wages a passive fight against starvation and suffocation with mussels, barnacles, sponges, worms, aquatic vegetation, and other prolific or luxuriant organisms growing on the beds.

Ostrea virginica occurs from the Gulf of St. Lawrence to the tropics, but between Cape Breton and Cape Cod the Sheepscot River, Maine, is its only locality. It has also been introduced in San Francisco Bay, where it breeds to a limited extent. The yield of Eastern oysters at the beginning of the present century was as follows:

	Bushels	Value*
Gulf States	1,987,216	$687,539
South Atlantic States	1,612,181	384,934
Middle Atlantic States	19,749,677	10,286,556
New England States	2,649,072	1,910,684
Pacific States	360,000	792,000
Canada (estimated)	95,000	150,000
Totals	26,453,146	$14,211,713

* Value to oystermen and growers.

The greatest production is in Chesapeake Bay, where the principal yield is from the natural beds. Most of the oysters from New England and from New York and the outer coast of New Jersey are produced by planted beds; the entire yield of the Pacific coast is similarly derived, and there has been recently a considerable increase in oyster culture in New Jersey, Virginia, and other States. The number of persons engaged in the industry is estimated at upward of 60,000, but as many of them are employed part of the year in other fisheries, farming, etc., definite statistics are not available. Baltimore is the most extensive market and New York has a considerable export trade with Europe. Chesapeake Bay supplies more of the oysters of the United States than any other distinctly marked area, Long Island Sound ranking next in the output. The census reports show the total oyster product of the United States at 22,195,000 bushels in 1880, 28,284,000 bushels in 1889, 26,910,000 in 1897, and 33,330,000 in 1908. Of the 1908 product 16,982,000 bushels, or practically one-half of the total, are accredited to the Middle Atlantic States, 5,332,600 to the New England States, 4,364,000 to the South Atlantic, 6,343,000 to the South Gulf States, and 309,000 to the Pacific coast. The Middle Atlantic States, however, show a less total in 1908 than in 1897, while New England, the South Atlantic, and the Gulf group show in each case an increase of more than 100 per cent in the same period. In 1880 the Middle Atlantic States supplied 94 per cent of the output of the United States, but in 1908 only 51 per cent. The total value of the oyster product of the United States in 1908 was $15,713,000, forming 29 per cent of the value of all fishery products of that year. The value of the oyster product of the Middle Atlantic States in 1908 was $8,842,000 against $10,288,000 in 1900, while that of the other sections doubled in the same time. The gain of the other sections when compared with the Middle Atlantic section, was apparently due in large part to the fact that a large share of the product of the area of increase was from cultivated beds, while most of the Middle Atlantic product was from public beds. No complete census of the oyster industry has been taken since 1908. A report on

Maryland and Virginia in 1912, by the Bureau of Fisheries, puts the product of those States at 11,716,000 bushels, that of the Gulf States at 6,226,000 bushels, and that of the South Atlantic at 1,701,000 bushels.

The native oyster of the Pacific coast is *Ostrea lurida*, a small thin-shelled species. It is hermaphroditic and, like the European oyster, retains its young for a time in the mantle cavity. In 1901, 159,340 bushels, valued at $251,192, were marketed, principally on the Pacific coast.

PACIFIC COAST OYSTER.

The European oyster (*Ostrea edulis*) is found from Italy to Norway. It is a round thin-shelled species, more shapely than the American species, and hermaphroditic, first female and afterward male. It is less prolific than its American relative, and the young undergo considerable development in the mantle chamber of the mother. It thrives in water of full, or almost full, organic density. The Portuguese oyster (*Ostrea angulata*) sexually and in its habits more closely resembles *Ostrea virginica*.

The oysters of Japan are *Ostrea cucullata*, which occurs in shallow and moderately brackish or moderately salt water throughout the whole archipelago, and *Ostrea gigas*, a very large salt-water species found in deep water. Many other species of *Ostrea* are found in temperate and tropical seas throughout the world. In round numbers the annual value of the oyster industry in the British Isles is $774,000; in France, $3,584,000; in Holland, $422,000; in Italy, $220,000; in other European countries, $201,000; in Asia, Africa, and Oceania, $557,000; or a total for the world of about $20,000,000.

Fossil Oysters. The oyster family appears to have had its origin in some imperfectly known forms, such as *Ostrea nobilissima* of the Carboniferous. The family is found also in the Permian. In the Triassic it is represented by a strongly plicated form, *Alectryonia*, which form becomes more prominent in the Jurassic and Cretaceous. There are also the common arcuate shells of *Gryphæa* and *Exogyra* in the Jurassic and Cretaceous. *Ostrea* itself is known in the Mesozoic, but it attained its maximum of size and abundance in the Tertiary. The sandy marls of this period in the southeastern United States often contain great numbers of very large specimens of oysters, especially of two species, *Ostrea georgiana* and *Ostrea sellæformis*. Consult C. A. White, "A Review of the Fossil Ostreidæ of North America and a Comparison of the Fossil with the Living Forms," *Annual Report of the United States Geological Survey*, vol. iv (Washington, 1883).

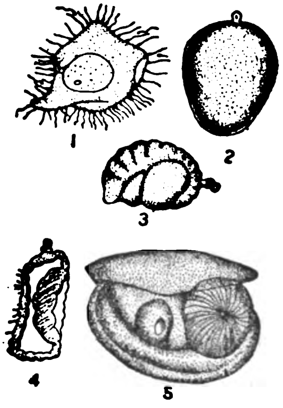
Oyster Culture. Owing to the exhaustion of the natural beds and their inability to supply the demand for oysters, it has been found necessary to resort to artificial methods of production, effecting (1) an increase in the number of eggs fertilized; (2) an increase in the surfaces available for fixation and also of the number of spat attaching; (3) the saving of spat and young oysters which would naturally fall victims to enemies and adverse physical conditions; and (4) the utilization of barren bottoms and naturally unavailable food supplies. But a small part of the area under water suitable for oysters has been utilized by nature, mainly for lack of suitable bodies for the attachment of the young. In the United States such barren bottom is utilized by clearing it of all rubbish and either planting cultch to collect the spat or else young oysters (seed), that they may improve in size, shape, and quality under conditions safer and more favorable than in their original environment. In certain places either method may succeed, but commonly a locality is better adapted to one than the other.

The most suitable bottom for oyster culture consists of firm mud or of a firm substratum with a thin surface of soft mud, but stable sandy bottom is often used with success. Rocky bottom is usually deficient in food, loose sand drifts and covers the oysters, and very soft mud engulfs and stifles them or produces inferior elongate stock. Mud naturally too soft may be utilized by distributing over it shells, sand, or other material which, resting on or near the surface, furnishes a firm foundation upon which the growing oyster may repose in security. For spat collecting it is frequently advantageous to use hard mud, gravel, or rocky bottom in shoal water, ill adapted to adult oysters from deficiency of food. The bottom being properly prepared and its boundaries marked with stakes or buoys, either system may be adopted to accord with circumstances. Generally seed planting is more certain in its results and yields quicker returns to the grower. Seed oysters vary from blisters ½ inch in diameter to individuals almost ready for market, but ordinarily they are between 1 inch and 3 inches long. They are obtained from planters making a specialty of seed production or from natural beds, their cost varying from 10 cents to $1 per bushel, the larger culled stock, separate, well shaped, and free from rubbish, bringing higher prices and giving the best results. From 300 to 600 bushels of culled seed per acre are used, a larger quantity of rough material being required, as much of it consists of old shells and débris. It is usually sowed broadcast with shovels from boats. Further attention, other than that required to keep the beds clean and free from enemies, is generally unnecessary, especially if culled seed has been used.

The system of spat collecting is often extremely productive, though sometimes, for reasons not well understood, it results in complete failure. Spat will attach to almost any clean solid body, but certain materials, from their shape, structure, or cheapness, possess advantages which commend them. The most widely used and one of the best forms of cultch consists of the clean shells of the oyster itself. They are cheap, readily obtainable in all oyster regions, and, owing to their size and shape, can be used with success on bottom too soft for most other materials. The principal objection to them is that so many spat sometimes attach to a shell that they have no room for growth, and scallop (*Pecten*), jingle (*Anomia*), and other small fragile shells are sometimes preferable, as they catch the spat in smaller clusters and tend to break up as the oysters grow, but, owing to their lightness, they cannot be used in strong currents. The cost of oyster shells is from two to five cents per bushel, and sometimes they may be had for the hauling. Coarse gravel, pebbles, and crushed stone are used to a considerable extent in Long Island Sound and vicinity, but require a harder bottom than shells. The particles average about the size of a walnut or smaller, and as but few spat attach to each, the oysters are well shaped, less laborious to cull, and a larger proportion survive. This material costs from five to eight cents per bushel, and the cost of planting is about the same as of shells, one-half cent to five cents per bushel, according to local conditions.

Shells, stones, and gravel are distributed, like seed, from boats or scows. From 250 to 600 bushels per acre are used, soft bottom requiring more than hard. If there are extensive beds of adult oysters in the vicinity, and especially if the currents set from them to the spat beds, they can be depended upon to supply the fry, but if not, adult oysters should be used in the proportion of 30 to 60 bushels per acre. The brood oysters should be planted several months before the spawning season, but the cultch should not be put down until spawning is about to begin, that it may be free from slime and sediment when the fry is ready to fix, even a thin coating of sediment being sufficient to suffocate the young oyster at that period.

Some planters allow the beds to remain unworked until the crop is ready to market, but to produce oysters of superior shape and quality the clusters should be taken up and separated as soon as they can be culled without injury. It frequently happens that good localities for obtaining a set are not favorable to the production of marketable oysters, and in this case the culled young may be transplanted with advantage and profit to beds possessed of an environment more favorable for the adults. Whether cultch or seed be planted the beds should be closely watched to protect them from enemies which sometimes work havoc unsuspected until the time comes to market the crop.



OYSTER DEVELOPMENT.

1, unfertilized egg shortly after mixture of spawn and milt; spermatozoa are adhering to the surface. 2, same egg a few minutes after fertilization; polar body at broad end. 3, optical section of egg 27 hours after impregnation, showing two large cells, covered by a layer of small ectodermal cells. 4, optical section of an older egg, now become flattened from above downward. 5, an embryo with well-developed larval shells.

The United States Fish Commission is experimenting with a system of fattening oysters artificially by using fertilizers to stimulate the production of oyster food in ponds. Good results have been attained, but the commercial feasibility of the method has not yet been demonstrated. The alleged method of fattening oysters by feeding with corn meal is worthless. Plumping them by placing in fresh or nearly fresh water is a bloating and not a fattening treatment, and is less resorted to than formerly. Oysters should not be planted or bedded in the vicinity of sewage contamination, as they may thereby become sources of disease infection, but there is no danger to be apprehended from the consumption of oysters from beds remote from sources of contamination. Green oysters are sometimes placed on the market. There are three types of greenness, two of which are perfectly harmless. The third type is evidently a pathogenic condition, correlated with the presence of copper; but, while the affected oysters are poor in quality, it is not demonstrated that they are dangerous.

In England oyster culture is practically along the same lines as in the United States. Shells are used to collect the spat and seed oysters are planted in favorable places, notably on the bottoms controlled by the Whitstable Company, a coöperative corporation. On the Continent the methods are more elaborate, the low price of labor and the high price of oysters, as well as the restriction of the area upon which they can be grown, tending to encourage an intensive system of culture. Tiles and fascines are generally used as spat collectors, and especially in Holland and France a system of ponds or claires is used for growing and fattening. Japanese methods somewhat resemble those of France and Holland in the recognition of a distinction between the bottoms used for spat collection and for growing, although ponds are not used. Bamboo branches in regular arrangement are used as spat collectors, and the oysters are usually twice transplanted, first to a place favorable for rapid growth and finally to beds especially rich in food, where they fatten. See OYSTERS, LAW AS TO.

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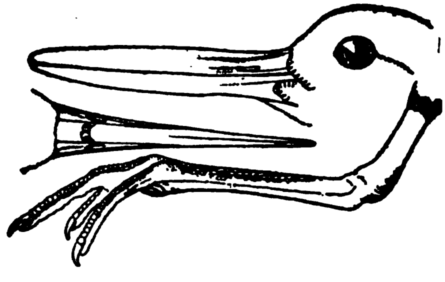
OYSTER BAY. A town, popular both as a residence place and as a summer resort, in Nassau Co., N. Y., 33 miles by rail northeast of New York City, situated on the northern coast of Long Island, on a deep, sheltered bay opening into Long Island Sound (Map: New York, B 2). A line of steamboats and a branch of the Long Island Railroad connect Oyster Bay with New York. The town offers attractions of fine scenery and facilities for boating, bathing, and fishing. It has many handsome residences and a public library. The principal industry is oyster cultivation. The government is administered by town meetings, held every two years. Pop., 1900, 16,334; 1910, 21,802; 1915 (State census), 29,948. Within the limits of Oyster Bay are the villages of Sea Cliff, Glen Cove, and Hicksville. Oyster Bay is the home of Theodore Roosevelt.

OYSTER CATCHER, or MUSSEL PICKER. A long-legged shore bird of the stilt family, having a long, hard, wedge-pointed bill. One species inhabits the northern part of the Old World and another North America, but the term is occasionally extended to other related forms. The common one in the United States (*Hæmatopus palliatus*) is from 18 to 20 inches long, smoky brown above, with head and neck black, and white beneath. It is found on both coasts of both American continents, but rarely occurs north of New Jersey. It feeds on oysters, clams, and other mollusks, and breeds freely on the coast of Virginia. On the Pacific coast occurs an oyster catcher (*Hæmatopus bachmani*) which has no white in its plumage. Both of these feed largely on worms, crustaceans, and the like, as well as on mollusks. The European species (*Hæmatopus ostralegus*) is similar in all respects, and is known in Great Britain (where it breeds numerously on all sandy coasts) as sea pie, on account of its handsomely variegated black and white plumage, resembling that of the magpie. Consult Newton, *Dictionary of Birds* (London and New York, 1893–96).



BEAK AND FOOT OF THE AMERICAN OYSTER CATCHER.

OYSTER CRAB. A small brachyuran crab of the genus *Pinnotheres*, the females of various species of which are about the size and shape of a pea and hence are called pea crabs in Great Britain. These females live as commensals (see COMMENSALISM) within the shells and mantle lobes of various bivalved mollusks. A familiar American species is *Pinnotheres ostreum*, found in oysters and bright reddish yellow when cooked. It is esteemed a great dainty, and large numbers are used for food in the eastern United States. Another species is very common in the wing-shells (*Pinna*) of the Mediterranean, and was imagined by the ancients to render important services to its host in return for its lodging, keeping a lookout for approaching dangers, against which the blind pinna itself could not guard.

OYSTER FISH. See TAUTOG.

OYSTER MUSHROOM. See Colored Plate of FUNGI, EDIBLE.

OYSTER PLANT. See SALSIFY.

OYSTERS, LAW AS TO. Oysters are classed with animals *feræ naturæ* (of a wild nature), and, therefore, in their wild state may be gathered by any one when found in navigable waters. In England the cultivation of oysters has been protected and encouraged by statutes since the reign of Richard II. Most of the oyster beds in the waters about the British Isles are now enjoyed by virtue of special grants from the crown, or by lease from royal commissioners, or by prescription, i.e., long-continued possession and user under the laws of England. No one can appropriate to his exclusive use land under public waters for the purpose of establishing an oyster bed, but, after gaining the right by grant or lease, a person has an absolute ownership in the oysters he plants or deposits in the space allotted to him, and appropriation of them by another in such a case is punishable as a misdemeanor.

In the United States generally, after wild oysters are gathered and planted, i.e., placed in another location for the purpose of propagation, they remain the property of the person who has thus reclaimed them, even though he plants them in public waters. This rule has been modified in most States in whose waters oysters are found, by statutory provisions regulating the industry, especially in regard to giving notice to the public where a person appropriates land under public waters for an oyster bed and also establishing close seasons. In such States, therefore, any one has a right to preëmpt an unoccupied area under public waters and establish thereon an oyster bed. When a bed is once established, as long as it is maintained the law protects the owner, as the person planting the bed is called, in his property right in the oysters and in his possession of the area which his bed covers. The statutes usually require one who claims an oyster bed to stake it off by means of long poles embedded in the mud at the bottom and extending above the surface of the water. This is for the purpose of giving notice to the general public and avoiding an innocent invasion of the owner's rights. A person cannot, however, acquire property right to a bed of oysters by planting young oysters in a natural bed already containing oysters in sufficient quantities to make it profitable for the public to gather them. If a person thus mingles his oysters with others which the public may gather he loses all separate property right in them and can only gather them like any other citizen of the State. Natural oyster beds are defined to be those that are not planted by man, but where oysters are to be found growing in sufficient quantities to be valuable to the public without cultivation.

Where no definite period for the enjoyment of the privileges of oyster beds is fixed by statute, the right to use the public land under water for such purpose is construed to be a conditional or qualified license, which is personal in its nature and not inheritable or transferable, and the State in which the beds are situated may at any time revoke the license and demand back the possession of the submerged land, giving the owner of the oysters a reasonable time in which to remove them. This right of the State will not ordinarily be exercised, and as the owner of the oysters may dispose of them in any way he sees fit, and as they will go to his representatives at his death, it is often popularly supposed that the possession of the submerged land itself is a property right in the person who is said to own the bed. The occupation of an oyster bed by an individual does not interfere with the rights of the public to fish in the waters above the bed. Any person who takes oysters from a private oyster bed without permission is guilty of larceny. See Feræ Naturæ; Fishing Laws.

OYSTER-SHELL BARK LOUSE. A popular name for the most abundant and widespread of scale insects (*Mytilaspis pomorum*), which occurs most abundantly upon the apple, but is found also in various parts of the world upon pear, quince, hawthorn, willow, maple, elm, and many other trees. It was introduced into the United States from Europe at the close of the eighteenth century, and spread gradually throughout the country until it is now present practically wherever the apple is cultivated. The insect hibernates in the egg state under the old female scales. The young hatch in spring, wander out upon the twigs, and settle at once upon both the young twigs and the fruit. This insect occurs rarely upon the leaves and is not common upon fruit, but frequently clusters upon twigs and limbs so as completely to cover the bark. In the southern United States there are two generations each year, but in the North only one. After settling the female molts twice and begins the formation of the scale. The male is much smaller than the female, and is distinguished by the fact that it has but one cast skin at its anterior end, whereas the female has two. The scale of the adult is of almost the same shape as an oyster shell, whence the popular name. The insect is readily destroyed in the spring, after the young have hatched, by the application of a dilute kerosene emulsion in the form of a spray. Consult L. O. Howard, in *Year Book of the United States Department of Agriculture* (Washington, 1894). See Scale Insect; Mussel Scale.

OZAKA. See Osaka.

OZANAM, ō'zȧ'näN', Antoine Frédéric (1813–53). A French Roman Catholic writer. He was born at Milan and began to study law at 16, besides picking up several languages and contributing to the periodical press. In 1832 he went to Paris to pursue his studies, and took his doctor's degree in law after four years; in literature, six years later. He soon came into close relations with Chateaubriand, Lacordaire, and Montalembert, and threw himself ardently into the cause of the church, hoping that the revolutions of France would issue in a Christian democracy. With seven other students he founded the St. Vincent de Paul Society. (See Saint Vincent de Paul, Society of.) In 1839–40 he was professor of commercial law at Lyons and in 1844 became professor of foreign literature at the Sorbonne, where he won great popularity as a teacher. His special study was the history of mediæval civilization, particularly with the view of showing the beneficent influence of the church and her doctrines. His health proved unequal to his diligence as a teacher, and after more than a year's sojourn in the Pyrenees and Italy he died at Marseilles, Sept. 8, 1853. His collected works appeared in 11 volumes (Paris, 1862–65). Important among them are: *Dante et la philosophie catholique au treizième siècle* (1836; Eng. trans., New York, 1897); *Etudes germaniques pour servir à l'histoire des Francs* (1847–49); *Documents inédits pour servir à l'histoire littéraire de l'Italie* (1850). In English translations have also appeared: *History of Civilization in the Fifth Century* (London, 1868); *Protestantism and Liberty* (ib., 1874); *Franciscan Poets in Italy of the Thirteenth Century* (New York, 1914); *Bible of the Sick* (New York, 1880); *Pilgrimage to the Land of the Cid* (2d ed., ib., 1875), and the volume of letters, which contains a sketch of his life (ib., 1886).

Bibliography. *Lives* by U. Legeay (Paris, 1854); M. de Montrond (Lillé, 1869); C. A. Ozanam (2d ed., Paris, 1882); C. Huit (ib., 1888); J. Laur (ib., 1895); Kathleen O'Meara (2d ed., New York, 1911); A. J. Dunn (ib., 1913).

OZANAM, Jacques (1640–1717). A French mathematician, born at Bouligneux, of Jewish descent. He was trained for the Catholic priesthood, but after his father's death devoted himself to mathematics and taught at Lyons and then in Paris, where, in 1701, he was admitted to the French Academy of Sciences. His works include: *Géométrie pratique* (1684; republished, 1764); *Tables des sinus, tangentes et sécantes* (1685; 3d ed., 1741); *L'Usage du compas* (1688; 5th ed., 1794); *Dictionnaire mathématique* (1691); *Récréations mathématiques et physiques* (1694), which was frequently republished (in English by Hutton, 1803); *La perspective théorique et pratique* (1711; 2d ed., 1720).

O'ZARK MOUNTAINS. A low, domelike plateau or uplift in the Mississippi valley between the Missouri and the Arkansas rivers (Map: Missouri, C 5). It covers the greater parts of southern Missouri and northern Arkansas and extends some distance into Kansas and Oklahoma. It consists of Paleozoic rocks, and in many respects resembles the Alleghany plateau, but is much less dissected. It rises gradually from the north, but is somewhat escarped and rugged in its southern portion in Arkansas, where the highest points in the uplift occur and where it is also heavily timbered, this part of the country being in marked contrast with the surrounding plains. The plateau nowhere rises much above 2000 feet. The Ouachita Mountains, south of the Arkansas River, are an outlying portion of the main plateau. Consult C. F. Marbut, "Soil Reconnoissance of the Ozark Region of Missouri and Arkansas," in *Field Operations of the United States Bureau of Soils* (Washington, 1912).

OZE'NA (Lat. *ozæna*, from Gk. *ὄζαινα*, *ozaina*, fetid polypus in the nose, from *ὄζειν*, *ozein*, to smell; connected with Lat. *odor*, *olor*, odor). A term applied generally to diseased conditions of the nose characterized by great fetor of the breath. It may be due to syphilitic necrosis of the intranasal structures or to tuberculous or malignant ulceration. When due to these causes there is an accompanying purulent discharge from the nostrils. In atrophic rhinitis the morbid secretions accumulate in the nasal passages and form dry crusts over the mucous membrane. These decompose and give rise to the peculiarly offensive odor from which the disease derives its name.

The disease is chronic and difficult of management. Much benefit, however, is secured from the removal of the fetid crusts and secretions by the frequent use of alkaline and antiseptic douches, followed by the application of mildly stimulating substances to the affected mucous membrane. True atrophic rhinitis involves not only the mucous membrane and submucous areolar tissue, but also attacks the bone and extends into the accessory nasal sinuses. Irrigation of these is of marked benefit in treating the disease. The most valuable drug for internal administration is potassium iodide, which liquefies the secretions and prevents crust formation. Vaccine therapy is also helpful in the treatment of ozena.

OZERO, Lake. See Bielo-Ozero.

OZEROV, ŏ'zye-rôf, Vladislav Alexandrovitch (1769–1816). A Russian pseudoclassical dramatic writer. He graduated from the Cadet Corps, was adjutant to its director, served in the army and the Department of Forestry, and in 1808 retired, with the rank of major general, to devote himself to literature. An admirer of the French Classicists, he closely imitated Ducis's *Edipe à Colonne* in his first success, *Œdipus at Athens* (1804). His fame grew with *Fingal* (1805), which was based on Ossian, and reached its zenith in *Dmitriy Donskoy* (1807), which ostensibly dealt with the Russians' liberation from the Tatar yoke, but contained veiled allusions to Napoleon I, then at war with Russia. *Polyxena* (1809), though unsuccessful with the public, was his favorite tragedy. The fifth edition of his works appeared at St. Petersburg in 1856.

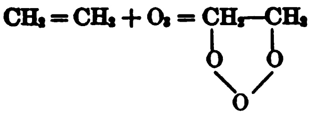
OZOCERITE, ŏ'zô-sē'rīt, **OZOKERITE**, ŏ'zô-kē'rīt (from Gk. *ὄζειν*, *ozein*, to smell + *κηρός*, *kēros*, wax), or Native Paraffin. A yellow, brown, and sometimes green, waxlike substance, originally found in Moldavia and Austrian Galicia and more recently in Emery and Uinta counties, Utah, where it occurs in the form of small veins in Tertiary rocks. It consists chiefly of a mixture of hydrocarbons, is greasy to the touch, and melts between 56° and 63° C. (133° and 114° F.). It finds some use in the manufacture of candles, as an adulterant or substitute for beeswax, and in the manufacture of ointments and pomades. A residual product obtained in purifying ozocerite, having a hard waxy nature, is combined with India rubber and used as an insulating material (okonite) for electric cables.

O'ZONE (from Gk. *ὄζειν*, *ozein*, to smell), or Active Oxygen, O_3. A colorless gaseous allotropic modification of oxygen. (See Allotropy.) In 1785 Van Marum observed that oxygen gas through which an electric current had been passed, as well as the air of oxygen in the vicinity of an electric machine, possessed a peculiar odor somewhat resembling chlorine. He referred to it as the smell of electricity. In 1801 Cruikshank observed a similar odor when water was decomposed by electrolysis. Schönbein, in 1840, investigated the matter and established the fact that the odor was due to the formation of new gas, which he named ozone. He showed that ozone was generated by the action of phosphorus on moist air and that it was capable of liberating iodine from potassium iodide. Its constitution was a matter of doubt until Soret determined the fact that it was an allotropic form of oxygen produced by the condensation of three volumes of oxygen into two of ozone. It is found in minute quantities in the atmosphere, of which it is regarded as a normal constituent, and its presence is believed to be due to the electric discharges during thunderstorms, silent discharges from thunderclouds, vibrations of water, especially of saline waters, as in sea foam, and the action of some vegetable products on the air. Ozone is also said to be formed by the action of sunlight on clouds, and the blueness of the sky has been attributed to its presence. Ozone is formed when a series of electric sparks is passed through oxygen or air, and it is evolved at the positive pole in the electrolysis of acidulated water. The slow oxidation of phosphorus in air yields ozone, and it may also be obtained by the action of strong sulphuric acid on barium peroxide. Certain organic substances, such as turpentine, various essential oils, etc., generate ozone when exposed to the air. At present ozone is manufactured on a large scale by the action of the silent electric discharge upon oxygen or, more usually, atmospheric air. In the different apparatus in use (called ozonizers) the electric pressure employed varies from 5000 volts to 80,000 volts and even more. The working of any of these ozonizers has proved to be quite economical, and ozone has to-day become a cheap commercial commodity.

Ozone is a gas with a strong penetrating odor resembling that of diluted chlorine. When condensed under a pressure of 125 atmospheres at −103° C. it forms a deep-blue liquid. It is more strongly magnetic than common oxygen. It decomposes slowly even at ordinary temperatures. It is a very strong oxidizing agent, converting copper, mercury, silver, and iron into their oxides. It oxidizes most organic compounds, destroying rubber and vulcanite with great rapidity; also it bleaches many colored vegetable and animal products, such as indigo, litmus, blood, etc. Its powerful oxidizing properties are taken advantage of for commercial purposes, and its artificial production for the purpose of purifying the air of crowded apartments and sick rooms has now become very extensive. In 1915 the New York Zoölogical Park was experimenting with ozone in an effort to deodorize the air in the animal houses.

Ozone finds some application for bleaching, as in the case of discolored engravings, where the printed portion is rolled up and inserted in a glass vessel, on the bottom of which some water and pieces of phosphorus have been placed. More extensively ozone is used for bleaching fabrics, oils, waxes, etc., and for improving and strengthening yeast in the manufacture of beer. It has also been used to oxidize alcohol to aldehyde and to vinegar and for the rapid aging of liquors. Slightly ozonized air and oxygen are used medicinally, especially in pulmonary complaints, although if too strong it is said to produce harmful effects, causing headache and irritating the mucous membranes of the respiratory organs. But by far the most extensive use of ozone is for the purification of drinking water. That water can be completely sterilized by moderate quantities of ozone (or rather ozonized air) has been conclusively demonstrated by a number of scientific investigators, and highly efficient ozone purification plants have been installed and are operated successfully by many cities both in America and in Europe. See Oxozone; Ozonides.

OZONIDES, ŏ'zô-nīdz. A class of organic chemical substances obtained by the action of ozone, or rather of air containing several per cent of ozone, upon unsaturated compounds of carbon. The compound most used for this preparation of ozonides is ethylene (q.v.), which combines with ozone according to the following formula:



$$CH_2=CH_2+O_3=CH_2-CH_2$$

Ethylene ozonide

The preparation of an ozonide is best carried out at low temperatures, or else an explosion is likely to occur. Further, the substance to be transformed is to be dissolved in a solvent which is itself not too readily attacked by ozone. Chloroform and carbon tetrachloride have often been used. Acetone, however, is less readily attacked, and ethyl chloride may probably be recommended as the most desirable solvent. The ozonides form oily, explosive liquids, which cannot in some cases be distilled at all and at best can be distilled only under greatly reduced atmospheric pressure. Ethylene ozonide distills at ordinary laboratory temperatures if the pressure is reduced to 16 millimeters of mercury. See OXOZONE.

P

P The sixteenth letter in the English alphabet. It can be traced through the Latin and Greek alphabet to the Semitic *pē* (mouth), probably so called from the originally elliptical shape of the letter. The form of the letter is now essentially Roman, which differed from the Greek in that the second stroke was bent round to meet the first. See ALPHABET.

Phonetic Character. As a phonetic character *p* is the breathed or surd labial stop consonant corresponding to the voiced *b*. In forming the sound the lips are closed for an instant and the breath then escapes explosively. From the manner of its sound formation it is termed an occlusive explosive. The sound *p* is often voiced to *b*, which may then become the closely related *f* or *v*, as Lat. *episcopus* (bishop), Sp. *obispo*, Fr. *évêque*, Eng. *bishop;* Av. *xšapan* (night), Pers. *šab*, NBaluchi *šaf*, Kurd. *šav*. *P* in Sanskrit, Greek, and Latin becomes Germanic *f* by Grimm's law (q.v.), as Skt. *pād* (foot), Gk. *πόδ-α*, Lat. *ped-em*, Eng. *foot;* Skt. *napāt* (grandson), Lat. *nepos*, AS. *nefa*, Eng. *nephew*. In English *p* represents an original Indo-Germanic *b*, which was, however, of rare occurrence. As an example of an initial *p* from Indo-Germanic *b* may be cited Lith. *balà* (marsh), Eng. *pool;* and as an example of medial *p* from Indo-Germanic *b* mention may be made of Lat. *lubricus* (slippery), Eng. *slippery*. The digraph *ph* is pronounced *f*, as in *pharmacy*, *phonetic*, and is written *f* in Spanish and Italian, as *farmacia*, *fonetico*. In English words beginning with *pn*, *ps*, and *pt*, as *pneumatic*, *pseudonym*, *pteropod*, *p* is silent; also more rarely in a final syllable, as *receipt*. Such words are of Greek origin, as in pure Latin *p* combines initially only with the consonants *l* and *r*. A *p* in Latin is often euphonically inserted between *m* and *s* and *m* and *t*. This *p* is retained in English derivatives of such words, as, e.g., *redemption*, *sumptuous*.

As a Symbol. In mediæval numbers, P for 400, and $\bar{P}$ for 400,000. In chemistry P is the symbol for phosphorus. In music *p* is the abbreviation of piano (softly) and *pp* of pianissimo (very softly). P is the abbreviation of Latin *post* in P.M. (*post meridiem*) and in P.S., *postscript*.

PAALTJENS, päl′tyĕns, PIET. See HAVERSCHMIDT, FRANÇOIS.

PAARL, pärl. The capital of a district in the Province of the Cape of Good Hope, South Africa, on the south slope of the Drakenstein Range, 36 miles by rail northeast of Cape Town (Map: Cape of Good Hope, D 9). It is one of the most picturesque cities in South Africa, being full of quaint old Dutch houses dating from the latter part of the eighteenth century and in the best style of Dutch colonial architecture. It is the centre of a fruit-growing region, which is the wine-producing district of the colony. It dates from an ancient Dutch settlement, and derives its name, signifying "pearl," from a neighboring granite rock of pearllike appearance. Pop., 1904, 11,293; 1911, 11,018.

PAASCHE, pä′she, HERMANN (1851–). A German economist and authority on the sugar industry. He was born at Burg, near Magdeburg, studied at Halle, became professor at Rostock (1879) and at Marburg (1884), and occupied a chair in the Berlin Polytechnic Institute (1897–1906). He was elected to the Reichstag as a member of the National Liberal party in 1881. From 1893 to 1908 he was a member of the Prussian Lower House and was elected second vice president of the German Reichstag (1902) and first vice president (1907, 1912). In 1892 and 1905 he visited the United States. He wrote: *Studien über die Natur der Geldentwertung und ihre praktische Bedeutung in den letzten Jahrzehnten* (1878); *Wandlungen in der modernen Volkswirtschaft* (1890); *Zuckerindustrie und Zuckerhandel der Welt* (1891), his most important work; *Kultur- und Reiseskizzen aus Nord- und Mittelamerika* (1894); *Die Zuckerproduction der Welt* (1905); *Deutsch-Ostafrika* (1906).

PABIANICE, pä′byȧ-nyĕ′tse. A manufacturing town in the Government of Piotrkow, Russian Poland, situated about 10 miles southwest of Lodz, to which it is connected by an electric line. It has textile mills and manufactures paper and agricultural machines. Pop., 39,000.

PABST, păpst, FREDERICK (1836–1904). An American brewer, born at Nicholausreith, Saxony. He emigrated with his parents to Chicago, and when 21 years old had become captain of a lake steamer. In 1862 he became a partner at Milwaukee, Wis., in the brewery business of his father-in-law, Philip Best, and in 1873 became president of the corporation that had been organized. In the following year the capital was increased to $2,000,000 (later to $4,000,000), and the corporate name was changed to the Pabst Brewing Company.

PA′CA (Neo-Lat., from *pak*, *paq*, the native name in Brazil), or SPOTTED CAVY. One of the largest of the agoutis (*Cœlogenys paca*), found from Paraguay to Venezuela east of the Andes. It is about 2 feet long and dark brown in color, with four rows of white spots along the sides, and the throat and belly black. The form and gait are clumsy, yet the paca is quick and agile. It lives in moist ground, makes burrows, and feeds on plants, often damaging sugar plantations. The skull of this animal is remarkable for the great development in the breadth of the jugal arch, inclosing a large cheek cavity, which gives an extraordinary breadth and swollen appearance to the face. One or more other species inhabit the high Andes of Ecuador, and are much sought after as food by the aid of trained dogs. Consult F. E. Beddard, *Mammalia* (London, 1902).

PACA, William (1740–99). An American political leader and jurist, one of the signers of the Declaration of Independence, born at Wye Hall, his father's estate on the eastern shore of Maryland. He studied at Philadelphia College, then went to England, where he was entered at the Middle Temple, London, and in 1764 was admitted to the bar. He began the practice of law at Annapolis, and in 1761 was elected to the Legislature. He served again from 1771 until 1774, when he was chosen a delegate to the Continental Congress, of which body he continued to be a member until 1779. Personally a strong advocate of the independence of the Colonies, his hands were tied by the instructions of the Maryland convention, which as late as the middle of May, 1776, declared against a policy of separation. Paca and his supporters labored to secure a reversal of these instructions, and on June 28 the convention gave its delegates power to vote on the question according to their own judgment. After the new constitution of Maryland went into effect Paca was a member of the State Senate in 1777–79, and from 1778 to 1780 was Chief Justice of Maryland. He was then Chief Justice of the Court of Appeals in admiralty and prize cases in 1780–82, and Governor of Maryland from 1782 to 1785. He was a delegate to the State convention which ratified the Federal Constitution in 1788, and in 1789 was appointed United States judge for the Maryland District, holding this till his death.

PACAY, pȧ-kā' (Quichua name), *Inga feuillei.* A tree of the family Leguminosæ, subfamily Mimoseæ, a native of Peru, of rather large size, with a broad head, producing pods from 20 inches to 2 feet long, which contain black seeds embedded in a white sweet flaky substance, used as an article of food. The name is also applied to the mesquite *Prosopis dulcis*, or *juliflora* of some authors, the ground pods of which are fed to stock.

PACCA, păk'kȧ, Bartolommeo (1756–1844). An Italian diplomat and cardinal. He was born at Benevento, studied at Naples and Rome, and in 1785 became chamberlain to Pius VI, who advanced him rapidly, made him Nuncio to Cologne in 1786, and sent him as special envoy to Louis XVI in 1791. From 1795 to 1800 Pacca was Nuncio to Lisbon. One of the most prominent of the anti-French party, he was captured with the Pope in 1809 and imprisoned for two years. He urged Pius to break the agreement of Fontainebleau, and in consequence was banished by Napoleon (1814), but was recalled after the fall of the Empire and received in 1830 the see of Ostia and Velletri. He remained a strong opponent of reform. Pacca wrote *Memorie istoriche, etc.* (1830; 2d ed., 1843); *Relazione del viaggio di papa Pio VII* (1833); *Notizie sul Portogallo* (1835).

PAC'CANA'RISTS, or, less properly, **BAC'CANA'RISTS.** The followers of Nicolao Paccanari, who founded in Rome, in 1797, a society called the Society of the Sacred Heart of Jesus, in some ways similar to the Society of Jesus, which had been suppressed that year, and intended to carry on the work of the Jesuits. When the Jesuits were reëstablished in 1814 the Paccanarists were united to them. Their title was Regular Clergy of the Faith of Jesus.

PACCHIONIAN (păk'kĭ-ō'nĭ-*a*n) **BODY,** or Glandula Pacchioni. One of numerous small, whitish, granular-looking bodies, collected in clusters of varying size, found upon the human meninges, or cerebral membranes, principally in the following localities: upon the outer surface of the dura mater, in the superior longitudinal sinus, being received into little depressions, called Pacchionian depressions, on the inner surface of the skull; upon the inner surface of the dura mater; in the superior longitudinal sinus (a large venous canal, or vein, attached to the inner surface of the skull, running from before backward); upon the pia mater, near the margin of the hemispheres. They are named after Antonio Pacchioni, an Italian anatomist (1665–1726). The Pacchionian bodies are not glandular in structure. They are produced by an increased growth of the villi of the arachnoid. They not infrequently contain small, hard, calcareous concretions called brain sand. Their growth and consequent pressure produces absorption of the dura mater, through which they pass to the inner surface of the skull as well as into the superior longitudinal sinus. These bodies do not occur in infancy, and very seldom before the third year; usually after the seventh, increasing after this as age advances. Sometimes they are wanting. Their function is supposed to be that of lymph channels for the outflow of lymph from the subdural and subarachnoid spaces into the sinuses of the dura mater. Consult Henry Gray, *Anatomy, Descriptive and Applied* (new Amer. ed. by E. A. Spitzka, Philadelphia, 1913).

PACCIOLI, pȧ-chō'lē̇, **PACIOLI,** or **PACIUOLO,** pä'chē̇-wō'lō, Luca, or Lucas, de Borgo (c.1440–c.1515). An Italian mathematician, born at Borgo San Sepolcro in Tuscany. He was a Franciscan monk and in his younger days traveled extensively in the East. He taught mathematics at Florence, Rome, and Venice, and then took orders under the name Fra Luca Sancti Sepulchri. He afterward taught in various Italian universities. His chief work was the *Summa de Arithmetica, Geometria, Proportioni et Proportionalita* (1494; 2d ed., 1523), a work which touched upon substantially all that was then known of mathematics. This was the first important printed treatise on mathematics, with the exception of the Latin edition of Euclid, which first appeared in 1482. Paccioli was a judicious compiler and exerted a powerful influence on the teaching of the sixteenth century.

PACE. See Mile; Weights and Measures.

PACER (from *pacc*, from OF., Fr. *pas*, step, from Lat. *passus*, step, pace, from *pandere*, to stretch; connected with *patere*, to lie open, Gk. *πεταννύναι*, *petannynai*, to spread out). The ambling gait of the pacer, smooth, frictionless, and lateral, as distinguished from the diagonal gait of the trotter, has been appreciated from the earliest antiquity. In America the pacer long received slight encouragement in competition (the *American Turf Register* for 1870 records only 59 pacing races in the entire country during the preceding year); yet against all odds and mechanical contrivances to force the pacer to trot, his progeny continue to inherit his characteristics; and as it transpired that eventually pacers had greater speed than the trotter, he was first tolerated and then sought after. The time for a paced mile was gradually reduced from 2.28 until in 1897 Star Pointer made it in 1.59¼, and in 1906 at St. Paul, Minn., Dan Patch, paced by a runner drawing a sulky carrying a wind shield, cut this record to 1.55. In 1915 the world's trotting record was 1.54½, done by Uhlan at Lexington, Ky., in 1913. The gaits of trotting and pacing are practically interchangeable, though it is still true that a fast trotter becomes a faster pacer. The Narragansett pacer is supposed to have been a descendant of the Spanish horse. Governor Robinson is said to have brought some Spanish horses from Andalusia to New England, and the breed was kept up to supply the demand for them in the Cuban trade, but with the falling off of the trade the industry was allowed to lapse and the breed became extinct. Consult Hamilton Busbey, *The Trotting and Pacing Horse in America* (New York, 1904). See Horsemanship; Trotting.

PACHACAMAC, pă′chȧ-kȧ-măk′, Ruins of. The remains of a vast city of the Yuncas, the ancient coast Indians of Peru, situated about 20 miles southeast of Lima. It was their sacred city before the conquest of the Incas, and held the shrine of Pachacamac, the Creator or Maker of all things. The Incas, after they had subjugated the Yuncas, erected here a great temple of the sun and a house of the Virgins of the Sun. The ruins cover four large hills, which furnished abundant building material used in combination with bricks or adobes of sun-dried earth. The site is at present a waste of drifting sand, sometimes obscuring the buildings which in the rainless and frostless region are in a fair state of preservation. The city was well laid out, having broad streets and a surrounding wall with large gates for entering. The houses were great communal structures built in terraces like the New Mexican pueblos. There were capacious reservoirs and irrigation works; the hills were terraced, and upon the level areas thus secured were located the temple and other buildings. The principal Yunca structure, the temple of Pachacamac, is located on a headland about 500 feet above the sea, which breaks at its feet.

The hill has been surrounded by four terraces, forming a semilunar pyramid, the summit several acres in area. The entrance is from the east and the ascent is by a series of ramps. The walls were at one time painted red and adorned with frescoes. The temple covers an area 600 by 450 feet and is an aggregation of rectangular buildings and sunken courts on the various terraces. The shrine is on the summit at the southern corner behind two projecting rocks. The Inca convent stands on low ground near a small lake. It also is built of adobe bricks and covers an area 350 by 200 feet. It consists of a square, terraced area covered with buildings, and from this extends a long wall having 18 cells on the inner face. At a right angle another wall extends to a square terrace backed also with a niched wall, in which a fine example of the round arch has been found.

Around the temple of Pachacamac is a vast cemetery in which the flexed bodies of the dead, wrapped in cloth and secured with a network of cord, were placed in vaults lined with adobe bricks and roofed with canes and rushes. Some of the tombs have three or more chambers. The objects buried with the dead consist of pottery, bronze, gold, or copper objects, textiles, weaving apparatus, pigments, food, and the like. Uhle's investigations for the University of Pennsylvania at this site disclosed a very long period of occupation. He arranged the objects of art in a tentative historical series covering five periods. The clearest differences are seen in the early Tiahuanaco or megalithic culture and the late Inca culture.

Pachacamac, being a central shrine, first of the Yuncas and later of the Incas, was exceedingly rich; it is said that Pizarro secured here 1700 pounds of gold and 1600 pounds of silver at the sack of the temples. Consult: E. G. Squier, *Peru* (New York, 1853); Wiener, *Pérou et Bolivie* (Paris, 1880); Max Uhle, *Pachacamac: Report of William Pepper Expedition, 1895–1897* (Philadelphia, 1903).

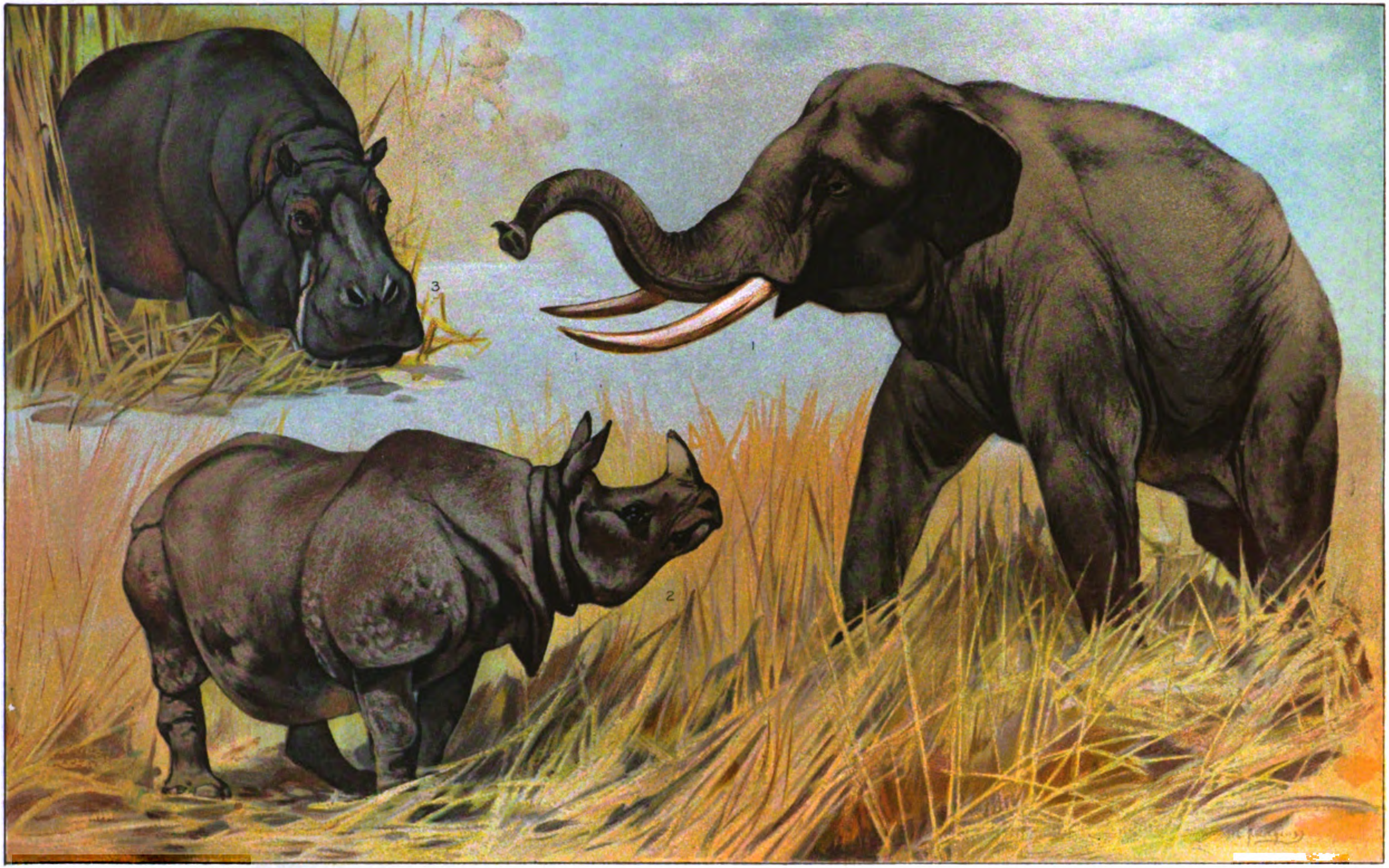
PACHECO, pȧ-chā′kō (de Padilla), Doña María. The wife of the Spanish patriot Juan López de Padilla (q.v.).

PACHECO, Francisco (c.1571–1654). A Spanish historical and portrait painter and writer on art. He was born at Seville and was a pupil of Luís Fernández, an imitator of Raphael. Some altarpieces, interesting on account of their realistic conception and treatment of chiaroscuro, are in the museum and churches of Seville, and his portraits in oil and crayon are not without merit, but Pacheco is remembered chiefly as the master and father-in-law of Velazquez, and deserves most lasting credit for his *Arte de la pintura* (Seville, 1639). This work was long considered a standard authority by Spanish artists, and also contains many valuable historical notices.

PACHELBEL, păĸ′el-bĕl, Johann (1653–1706). A German organist and composer, born at Nuremberg. First instructed there by Heinrich Schwemmer (1621–96), he next studied at Altdorf and Regensburg, and in 1674 went to Vienna, where he became assistant organist at St. Stephen's. Called to Eisenach in 1675, he was successively organist there, at Erfurt (1678–90), Stuttgart, Gotha, and finally (from 1695) at St. Sebaldus in Nuremberg. With Buxtehude, one of the immediate forerunners of Bach, he contributed much to the improvement of instrumental music. The few of his compositions that appeared in print include: *Musikalische Sterbens-Gedanken* (1683); *Musikalische Ergetzung* (1691); *Acht Choräle zum Präambuliren* (1693); *Hexachordum Apollinis* (1699). The manuscript of his important *Tabulaturbuch geistlicher Gesänge Martini Lutheri, etc.* (1704), is in the grand-ducal library at Weimar.

PACHMANN, päĸ′mȧn, Vladimir de (1848–). A Russian pianist, born in Odessa. He first studied music under his father, a professor in the University of Odessa, an amateur violinist and the friend of Beethoven, Weber, and other musicians. Subsequently he was sent to the Conservatory of Vienna, and, returning to Russia in 1869, made his first appearance as a pianist, and played also in Germany and France. In 1882 he went to London, and in 1890 traveled in the United States, making subsequent extended tours. His superlative interpretation of the works of Chopin won him his great reputa-

PACHYDERMS



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1 INDIAN ELEPHANT - ELEPHAS INDICUS 2 INDIAN RHINOCEROS - RHINOCEROS UNICORNIS
3 HIPPOPOTAMUS - HIPPOPOTAMUS AMPHIBIUS

tion. His eccentricities, which increased as he advanced in years, frequently marred his playing of other composers, especially Beethoven. In 1913 he retired from the concert platform.

PACHO'MIUS, Saint. An Egyptian monk who is held to have been the first to substitute for the free asceticism of the solitary recluse a regular cenobitic system. He was born about the year 292, of heathen parents, served as a soldier, and was converted to Christianity by the kindness of certain Christians whom he encountered at Thebes. About 318 at Tabennisi, an island in the Nile, he founded the first monastic institution. The members agreed to follow certain rules of life and conduct drawn up by Pachomius and to subject themselves to his control and visitation. His sister is said also to have embraced the cenobitic life and to have established the first convent for nuns. The pair labored with so much diligence and zeal that at their death, about 346, according to Palladius, not fewer than 7000 monks and nuns were under their inspection. The original information regarding him is in Palladius (q.v.), *Historia Lausiaca.* Consult: Grützmacher, *Pachomius und das älteste Klosterleben* (Freiburg, 1896); Amélineau, *Etude historique sur St. Pakhôme et le cénobitisme primitif dans la Haute Egypte* (Paris, 1887); P. Ladeuze, *Le cénobitisme pakhomien* (Louvain, 1898). See Monasticism.

PACHUCA, pȧ-chōō'kȧ, or Hidalgo. The capital of the State of Hidalgo, Mexico, situated 55 miles northeast of Mexico City (Map: Mexico, K 7). It is built in a mountain pass more than 8000 feet above sea level, and its principal industries are derived from the rich silver mines of the district. These are among the most important in the country; they are said to have been worked before the conquest, but still yield an annual output of 90,000 tons of rich argentiferous ore. It was here that in 1557 Bartolomé de Medina discovered the patio process of amalgamation, which is still considered the most economical process for reducing the peculiar ores of Mexico. Pachuca has many industrial establishments, including numerous reduction plants, which employ nearly 10,000 persons. Pop., 1910, 39,009.

PACHULSKI, pȧ-chụl'skē, Henryk (1859–). A Polish composer. Born at Lasa in the Province of Sedlitz, he studied music (under Strobl and Zelenski) at the Warsaw Musical Institute. In 1880 he entered the Moscow Conservatory to study under Rubinstein (q.v.), an object which was frustrated a year later by the latter's death. In 1886, on Tschaikowsky's recommendation, he was appointed professor of piano playing at the Moscow Conservatory, from which he had graduated the year before. As a composer he owes much to Taneiev (q.v.). His original compositions, almost all piano pieces, are very numerous. More important, however, are his piano arrangements of Tschaikowsky's orchestral music, including his principal symphonies.

PACHYDERMATA, păk'ĭ-dẽr'mȧ-tȧ (Neo-Lat. nom. pl., from Gk. *παχύς, pachys,* thick + *δέρμα, derma,* skin). The pachyderms, an order of mammals in the system of Cuvier, including the rhinoceros, elephant, hippopotamus, tapir, hog, and other ungulate mammals regarded as thick-skinned. The group was a thoroughly unnatural one and the name is no longer in scientific use, although it has been adopted into literary service as a synonym for insensitiveness. Several of these animals are illustrated on the Colored Plate of Pachyderms.

PACHYMENINGITIS, păk'ĭ-mĕn'ĭn-jī'tĭs (from Gk. *παχύς, pachys,* thick + *μῆνιγξ, meninx,* membrane + *-ῖτις*). See Meningitis.

PACHYMERES, păk'ĭ-mē̆'rēz, Georgius (1242–c.1310). A Byzantine historian. He was born in Nicæa, was educated there, and in 1261 went with Michael Palæologus to Constantinople, his father's native city, where he entered the priesthood and held high office in both church and state. His most important work was a *Historia Byzantina,* covering the period 1255–1308, a valuable source for the reigns of Michael Palæologus and Andronicus II, which was edited by Bekker (Bonn, 1835), and also in Migne's *Patrologia Græca.* For his life and minor works, consult Carl Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897).

PACIF'ICA'LE. See Pax.

PACIF'IC OCEAN (from Lat. *pacificus,* peacemaking, peaceful, from *pax,* peace + *facere,* to make). The portion of the water envelope of the earth which lies between America and Asia-Australia. The name Pacific was given to it by Magellan. On the north it connects with the Arctic by the Bering Strait, and southward it merges into the great expanse of water sometimes called the Southern Ocean, the parallel of lat. 40° S. being usually taken as the limit in this direction. Some geographers consider the southern boundary to be the Antarctic circle. Its waters communicate with the Indian Ocean on the west by numerous passages in the island chain extending from southeastern Asia to Australia. The Pacific is the largest and deepest of the oceans. With the bordering seas—the Bering, Okhotsk, Japan, Yellow, Eastern, China, Celebes, Java, Molucca, Banda, and Arafura seas—which are regarded as its dependencies, it has an area of about 55,000,000 square miles, equal to the entire land surface of the globe. Its greatest length from north to south is about 7350 miles (9300 miles to the Antarctic circle), and the greatest breadth, along the parallel of lat. 5° N., 10,300 miles.

Pacific Basin. The configuration of the Pacific basin is quite irregular, although there are large areas where the bottom exhibits little relief. In general the depth increases from southeast to northwest. A vast depression known as the Tuscarora Deep extends from the Japan and Kurile islands eastward along the Aleutian chain towards the coast of North America. Within this area the depth exceeds 3000 fathoms and in places soundings of 4000 fathoms or more have been made. Another extensive deep lies south of the Tonga Islands, between the Chatham Islands and New Zealand on the west and the María Theresa Reef on the east. In the central part of the ocean are the Belknap, Miller, and Hilgard deeps. The deepest sounding, 5269 fathoms, was made in 1900 off the island of Guam by the United States ship *Nero.* A sounding of 5155 fathoms and another of 5147 fathoms have been made north of New Zealand. These depths are much greater than have been found in any other ocean. The most extensive plateau in the Pacific lies southeast of New Guinea and includes the Solomon, Ellice, Fiji, and Tonga islands, while a southern arm extends from the last-named group to New Zealand. The bottom within this area rarely exceeds 2000 fathoms in depth and much of it is less than 1000 fathoms. Other plateaus are occupied by the Marshall and Gilbert groups, by the Caroline Islands, the Low Archipelago, and Hawaii. A broad continental shelf extends along the eastern coast of Asia, but the western shores of America slope abruptly to the ocean floor. The mean depth of the Pacific is estimated at 2300 fathoms.

The proportion of land drained into the Pacific is small compared with the drainage received by the Atlantic, the total area being 7,500,000 square miles. Its basin includes the generally narrow strip of the American continent to the west of the Rocky Mountains and the Andes, Melanesia, the Indo-Chinese States, China, a small part of Siberia, and eastern Australia.

Winds. In the trade-wind belts of the Pacific the winds are generally quite uniform except when such belts approach the western coasts, where they are more or less modified by monsoon influences. In Polynesia hurricanes called typhoons are of frequent occurrence. North and south of the tropical zone the winds exhibit little regularity, being found to blow from all points of the compass during any given season of the year, though a westerly direction is most frequent. On the southern part of the coast of South America and the northern part of the coast of North America west winds prevail during the greater part of the year. In the Chinese seas the typhoon may occur at all seasons of the year.

Currents. The currents of the Pacific Ocean are less marked in character than those of the Atlantic. In a general way the movement and direction of these currents follow the prevailing winds. In the northern trade-wind belt a great equatorial current sweeps westward until at the western side it is largely deflected northward to the belt of westerly winds, where it flows northeastward as the Kuro Shiwo, or Japan Current, towards North America. A part of it subsequently turns southward along the American coast until it joins the equatorial current again. Thus the surface drift of the Northern Pacific Ocean constitutes a great eddy revolving slowly in the N.E.S.W. direction. In the Southern Pacific a similar surface drift in the opposite direction, viz., north, west, south, east, is maintained, though not so well defined because of the absence of the circumscribing continents. In the quieter waters at the centres of these great eddies are the sargasso, or masses of floating seaweed, but these regions are small compared with the Sargasso Sea of the North Atlantic.

Islands. The larger islands, with the exception of New Zealand, lie upon the continental shelf. The small islands which rise out of great depths are one distinctive feature of the Pacific. Most of these are volcanic and in equatorial regions are frequently surmounted by coral reefs.

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PACING. See Horsemanship; Pacer.

PACINI, pȧ-chē′nē, Filippo (1812–83). An Italian anatomist. He was born in Pistoia, studied medicine in Florence and Pisa, and became professor of anatomy at Florence. At 23 he made himself famous by rediscovering the peripheral nerve terminations which are called the corpuscles of Pacini (or of Vater, 1684–1751, who described them in 1730). Pacini wrote much on anatomy, especially microscopic, and on pathology and therapeutics. His more important monographs include those on artificial respiration (1870, 1876, 1877), which describe Pacini's method, one of especial value in resuscitating asphyxiated newborn children, and on cholera (1854, 1865, 1866, 1871, 1876, 1879, and 1880).

PACINI, Giovanni (1796–1867). An Italian composer and teacher, born at Catania, and pupil of Marchesi and Furlanetto. His first opera, *Annetta e Lucindo*, was produced in 1813, and this was followed by 42 operas during the subsequent 20 years. He was invariably successful and was able to command the best theatres and artists in Italy. After one of his operas had failed he retired for some time from the field of composition and devoted himself entirely to teaching, his school of music at Viareggio winning world-wide repute. His best work was done after 1840, the list of his compositions including about 90 operas, cantatas, masses, etc., besides numerous musical monographs and articles for musical periodicals. *Medea* (1843), *Saffo* (1840), and *La regina di Cipro* (1846) are regarded as his best works. He died at Pescia.

PACINOTTI, pä′chē-nŏt′tē, Antonio (1841–1912). An Italian physicist and electrician. He was born and educated at Pisa, taught there for two years and at Bologna (1864–73), and, after nine years in the University of Cagliari, in 1882 became professor at Pisa. He is best known for his invention in 1860 of a dynamo in which the coils of the armature were wound on a ring. Subsequently the same device was independently discovered by Gramme and was brought into extensive use in his machines.

PACIOLI, or Paciuolo, Luca. See Paccioli, Luca.

PACIUS, pä′sē-ụs, Friedrich (1809–91). A Finnish composer and violinist, born at Hamburg, Germany. He studied violin under Spohr and at the age of 25 he went to Helsingfors, where he was for many years instructor in music at the university. It is to Pacius that Finland is indebted for its most popular national songs (*Vårtland*, *Suomis Sång*, *Soldatgossen*, and others). Among his longer works are the two grand operas *Kung Karls jakt* and *Lorelen* and the operetta *Prinsessan af Cypern*. Besides winning fame as a national composer, Pacius enjoyed a considerable reputation in his day as a violin virtuoso.

PACK. A medical term applied to a blanket wrapped about the body. When wrung out of cold water and applied it is called a cold pack; when saturated with hot water, a hot pack; when used either warm or cold and surrounded by dry blankets it is known as a wet pack. The cold pack is applied to reduce fever, the hot pack to induce sweating. See Hydrotherapy.

PACK′ARD, Alpheus Spring (1798–1884). An American educator, father of Alpheus Spring Packard (1839–1905) and of William Alfred Packard. He was a graduate of Bowdoin College, where he was tutor from 1819 to 1824 and professor of the Greek and Latin languages and literatures from 1824 to 1865. Packard became Collins professor of natural and revealed religion and librarian in 1869, holding both offices until his death. During the last two years of his life he was acting president of the college. He edited and was joint author (with Nehemiah Cleaveland) of *The History of Bowdoin College, with Biographical Sketches of its Graduates* (1882). He also edited *Works of the Rev. Jesse Appleton, with a Memoir* (1836–37), *Xenophon's Memorabilia of Socrates, with English Notes* (1839; 3d ed., 1843), and contributed many articles to various periodicals.

PACKARD, Alpheus Spring (1839–1905). An American naturalist, named for his father (q.v.), and brother of William Alfred Packard. He was born at Brunswick, Me., graduated at Bowdoin College in 1861 and at the Maine Medical School in 1864, and studied under Agassiz in the Lawrence Scientific School, Harvard. In 1865–66 he was librarian and custodian of the Boston Society of Natural History, in 1867–78 curator and afterward director of the Peabody Academy of Science, Salem, and in 1871–73 State entomologist of Massachusetts. From 1877 to 1882 he was a member of the United States Entomological Commission. In 1878 he was appointed professor of zoölogy and geology in Brown University. His chief work was the classification and anatomy of arthropod animals, and contributions to economic entomology, zoögeography, and the phylogeny and metamorphoses of insects. In systematic zoölogy he proposed a new classification of the insects, a new grouping of the chief branches (phyla) of arthropods, a new order and several families of fossil merostomes, and the crustacean orders Phyllocarida and Syncarida. In comparative anatomy he discovered the brick-red renal glands of *Limulus*, the origin of the ovipositor and that of the spiral thread of the tracheæ. He was one of the founders and for 20 years editor in chief of the *American Naturalist*. His publications include: *Guide to the Study of Insects* (1869; 3d ed., 1872); *The Mammoth Cave and its Inhabitants* (1872), with F. W. Putnam; *Life-History of Animals* (1876); *A Naturalist on the Labrador Coast* (1891); *Lamarck, the Founder of Evolution: His Life and Work* (1901; Fr. trans., 1903); and school textbooks, such as *Zoölogy for High Schools and Colleges* (11th ed., 1904). His *Monograph of the Bombycine Moths of North America* was published in three parts (1895, 1905, 1915, ed. by T. D. A. Cockerell). Packard was also a contributor to the New International Encyclopædia.

PACKARD, John Hooker (1832–1907). An American surgeon, born in Philadelphia. He graduated at the University of Pennsylvania in 1850 and M.D. in 1853. Settling in his native city, he became connected with several hospitals and dispensaries. During the Civil War he was attached to the Christian Street and Satterlee army hospitals, with the rank of assistant surgeon, U.S.A. From 1863 until 1884 he was surgeon to the Episcopal Hospital and from the latter date until 1896 he filled a similar position at the Pennsylvania Hospital. His publications include the translation of Malgaigne's *A Treatise on Fractures* (1859); *Manual of Minor Surgery* (1863); *Handbook of Operative Surgery* (1870); *Sea Air and Sea-Bathing* (1880).

PACKARD, Joseph (1812–1902). An American Protestant Episcopal clergyman, born at Wiscasset, Me. He graduated at Bowdoin College in 1831, was a professor in Bristol College (Pennsylvania) in 1834–36, and was ordained priest in 1837. From 1836 until his retirement as professor emeritus in 1890 he was professor of sacred literature in the Protestant Episcopal Theological Seminary of Virginia, of which he was also dean for 15 years. He was a member of the American committee for the revision of the Bible in 1872–85, contributed largely to Church periodicals, edited Malachi in the translation of J. P. Lange's *Commentary* (1874), and published *Questions on the Gospels* (1855). Consult his autobiography, *Recollections of a Long Life* (Washington, 1902).

PACKARD, Lewis Richard (1836–84). An American classical scholar, born in Philadelphia, Pa. He graduated at Yale in 1856, studied further at Berlin University, in 1863 was appointed assistant professor of the Greek language and literature at Yale and in 1866 full professor. In 1880 he became president of the American Philological Association and three years later he was the second director of the American School of Classical Studies at Athens. With J. W. White and T. D. Seymour he was editor of the "College Series of Greek Authors" (Boston, 1885 et seq.). A collection of his lectures and essays was published in 1886 as *Studies in Greek Thought*.

PACKARD, William Alfred (1830–1909). An American classical scholar, born at Brunswick, Me. His father and brother, each named Alpheus Spring Packard, are treated separately. William A. Packard graduated at Bowdoin in 1851, studied at Göttingen in 1857–58, and became professor of the Latin language and literature in Princeton University. He wrote for the *Presbyterian Review* and the *Princeton Review* and revised the translation of Curtius' *Griechische Geschichte*, with translations from a later German edition.

PACK ARTILLERY. See Mountain or Pack Artillery.

PACK'ER, Asa (1806–79). An American capitalist, born at Groton, Conn. In 1822 he went to Pennsylvania and 11 years later undertook the charge of one of the first boats on the Lehigh Canal. He became contractor for the building of locks and of boats for the transportation of coal from Pottsville to New York. He projected and completed (1855) the Lehigh Valley Railroad from Mauch Chunk to Easton. In 1844 he served in the Pennsylvania Legislature and from 1853 to 1857 was a Democratic member of Congress. He was also judge of Carbon County from 1843 to 1848. Having amassed great wealth, he gave liberally to charities and founded and endowed Lehigh University (q.v.), Bethehem, Pa., in 1866.

PACKER COLLEGIATE INSTITUTE. A school for girls in Brooklyn, N. Y., chartered in 1853, replacing the Brooklyn Female Academy, destroyed by fire in 1852. The new school was founded on a gift of $65,000 by Mrs. Harriet L. Packer. It has primary, preparatory, academic, and collegiate departments. The attendance in 1914–15 was 641, including 120 collegiate, 373 academic, 148 preparatory, and 38 primary students, and the faculty numbered 54. The institute has thoroughly equipped buildings, valued in 1914–15 at $307,330, the total valuation of its property being $464,862. The library contained over 10,800 volumes. In 1915 the president was Edward J. Goodwin, L.H.D.

PACKETS, SAILING. See MERCHANT MARINE.

PACKFONG, păk'fŏng. See GERMAN SILVER.

PACKING INDUSTRY. The slaughtering of cattle, sheep, and hogs and the utilization of their carcasses is an important industry in many American cities, especially in the Middle West. The choicer parts of the animals are shipped in refrigerator cars and vessels to the markets for consumption as fresh meat, while other parts, especially in the case of the hog, are cured, by smoking or salting. The fatty portions are converted into lard and commercial grease by rendering processes. (See DIGESTER.) The bones are converted into glue or fertilizers and the hoofs and horns (see HORN) are used or sold for other purposes. The term "packing industry," which was originally applied to the curing and packing of the flesh of the hog, has been extended, with the development of the industry, to include all the multitudinous operations connected with the utilization and transformation into merchantable form of the different parts of animals slaughtered for food, in so far as these operations are conducted in a single plant.

The history of the packing industry begins in the seventeenth century in New England, where large quantities of pork were packed in barrels for foreign trade. The first packing house in the West was established in Cincinnati in 1818. Cincinnati continued to lead in the industry for many years, but is now surpassed by Chicago, while in many other Western cities, including Kansas City, South Omaha, South St. Joseph, Indianapolis, St. Louis, Sioux City, and Fort Worth, the industry has risen to great importance. Prior to 1872 most of the slaughtering was done during the winter months. About this time chilling processes began to be developed, which have since been brought to such a state of perfection that animals are killed and their products prepared for the market with equal success and in equal amounts in any season. Indeed, the development of the packing industry is largely due to the application of artificial means of refrigeration (q.v.), for at the foundation of all successful meat curing is the thorough chilling of the carcass.

Before cold storage of meat was introduced it was customary to ship the living animals to Eastern markets, and the long and tiresome journey was both cruel to the animals and harmful to the meat. Now the meat, after thorough chilling, is shipped in refrigerator cars to Eastern cities and placed in cold-storage warehouses owned by the packing company, from which it is delivered to dealers.

Labor-saving devices have been adopted at every step in the packing industry. The carcasses of hogs killed are hooked by the nose to an endless chain, passed through scalding vats, and then through an automatically adjusted scraper which deprives them of hair and bristles in a few seconds. The animals are then hoisted, head down, upon an inclined rail and disemboweled, beheaded, washed, trimmed, and whirled to the chill rooms at the rate of 20 a minute. In dressing hogs about 20 per cent is offal and the rest is used as meat, of which only about 10 per cent is sold as fresh meat. The other parts are cured, usually by pickling in brine for seven or eight weeks and then smoking for 24 hours. For the manufacture of sausage the meat used is chiefly trimmings, which are obtained from all parts of the establishment, a large part of them being head and hoof trimmings. The meat is chopped, mixed with potato flour and water, in the proportion of 40 per cent meat, 40 per cent potato flour, and 20 per cent water. Certain spices are also added, including sage, pepper, salt, ginger, and mustard. The intestines, which are used for sausage casings, are cleaned by machinery. They are filled with the sausage by means of a stuffing machine, which consists of two cylinders, the steam cylinder and the stuffing cylinder, and a piston rod directly connected with the piston rod of the steam cylinder. The sausage casings are slipped over a tube attached to the open bottom of the stuffing cylinder, and through this orifice the casings are filled at a rapid rate.

Another important part of the pork-packing industry is the manufacture of lard (q.v.). Two grades of lard are made, leaf lard and steam lard. In the leaf lard of commerce not only the pure leaf but all sorts of trimmings from the belly of the animal are used. Steam lard is made from scraps taken from all parts of the animal, particularly from the feet or even the feet themselves and the head bones.

In dressing cattle the parts intended to be sold as fresh beef are allowed to cool for 48 hours and then shipped. In the canning of fresh beef inferior meat is used, either poorer grades of cattle or poorer cuts.

Meat Inspection. Acts of Congress were passed in 1890, 1891, and 1895, which were designed to enable the Secretary of Agriculture to certify to the wholesomeness of the export meats and at the same time to protect domestic consumers from the meat of diseased or unsound animals. The provisions of these Acts were directed towards the inspection of all live cattle intended for export or whose carcasses or products were intended for export, the mandatory ante-mortem inspection of such animals, the carcasses or products of which entered interstate commerce, and the permissive post-mortem examination of the carcasses. But the annual appropriations up to 1906 were never sufficient to enable the government to cover all the establishments slaughtering for interstate trade. Indeed, some establishments which applied for inspection were refused on account of lack of money to carry on the work. Moreover, the above laws were silent on the subject of rejecting as food the carcasses and products of animals which on post-mortem examination were found unfit for consumption.

In 1898 general attention was called to the possible defects in the meat-inspection laws by the extraordinary prevalence of sickness in the volunteer camps at Chickamauga and other Southern points, which had been supplied largely with canned meats from the great packing centres. The presence of injurious preservatives in such provisions was suspected, and the general in chief, Nelson A. Miles, made a report to the President alleging that the army was being supplied with "embalmed beef" which was unfit for food. Expert examination, however, failed to establish the charges, and it was generally believed that the existing laws assured adequate protection of the public health, until early in 1906, when the publication of a novel dealing with conditions in the Chicago packing industry —*The Jungle*, by Upton Sinclair—led to the appointment by President Roosevelt of James B. Reynolds and Charles P. Neill, Labor Commissioner, as special commissioners, to investigate the conditions of the industry. After two and a half weeks' investigation in the packing houses and stockyards the commissioners reported to the President that the stockyards were filthy and unsanitary, that in the packing houses ventilation was wretched, and that meat products were handled with scant regard for cleanliness or for the health of the consuming public. The inspection, which was wholly confined to the time of killing, was inadequate to detect all cases of disease. The microscopic examination of pork was confined to that destined for export to Germany. The report was confined to matters witnessed by the investigators. That conditions of a more revolting nature existed was reported by various unofficial investigators and widely published in the United States and in Europe. Before the report of Messrs. Neill and Reynolds was made public a measure providing for thorough inspection was drafted by Senator Beveridge and attached as an amendment to the Agricultural Appropriations Bill. The cost of inspection was by this bill placed upon the packers, since, if borne by the government, objection would have been brought against the measure as new revenue legislation not originating in the House. The amendment was passed by the Senate without debate. In the meantime intense opposition to the Beveridge amendment had developed in the House. A new measure was prepared which made inspection permissive instead of mandatory and which relieved the packers of the cost of inspection. In messages to Congress and in letters to members of Congress President Roosevelt insisted upon the enactment of a measure insuring adequate inspection. On June 4 the President submitted to Congress a part of the report of Messrs. Neill and Reynolds. Under the pressure of public opinion a measure embodying the essential features of the Beveridge amendment was finally forced through Congress. This Act, which became law June 30, 1906, provides that all cattle, sheep, goats, and hogs shall be subject to ante-mortem examination when the meat thereof is to be used in interstate or foreign commerce, and such animals as are rejected must be slaughtered subject to post-mortem inspection. It further provides for the post-mortem inspection of all cattle, sheep, swine, and goats, the products of which are intended for interstate and foreign trade. Those found fit for human food are marked "U. S. Inspected and passed" and those carcasses found diseased or otherwise unfit for food are marked "U. S. Inspected and condemned," and all such condemned meats are destroyed in the presence of a government inspector. All meats which are marked "U. S. Inspected and passed" may be reinspected at any subsequent time, and if they have become tainted, unclean, or otherwise unfit for food, they must be destroyed. In order that the above slaughtering establishments shall be under the supervision of the government at all times, it is provided that the employees of the Bureau of Animal Industry shall have access to all portions of the plant, day and night, whether it is in operation or not. Furthermore, power is granted the Secretary of Agriculture to destroy all food products containing dyes, chemicals, or ingredients which render the meat unfit for food; and all food products prepared for the purpose of placing in cans, tins, pots, or other receptacles, in any establishment where inspection occurs, must be under the supervision of an inspector. Such tins and other receptacles shall then bear a label attesting that the contents have been inspected and passed. Such food products may not be sold under any false or deceptive name. The government is also empowered to appoint experts in sanitation to make inspection of all establishments and to prescribe regulations of sanitation to be maintained, and the products of an establishment in which sanitary conditions are not satisfactory may not enter interstate commerce. The government inspection label is a requisite to shipment of meat or meat products from one State to another or to a foreign country. This Act further provides that on and after Oct. 1, 1906, no carrier shall transport or receive for transportation any carcasses, meats, or meat food products which have not been inspected and marked "U. S. Inspected and passed." Any person or firm violating any of the provisions of the Act may be punished by a fine not exceeding $10,000, or imprisonment not longer than two years, or by both such fine and imprisonment. These penalties are also provided for bribery of inspection officials or the acceptance of a bribe. Farmers and retail butchers are exempted from the requirements of inspection. For the enforcement of this law a permanent yearly appropriation of $3,000,000 was made, which has been supplemented by annual appropriations, that in 1914–15 amounting to $375,000. Before 1906 the yearly appropriations for meat inspection were always less than requested by the Secretary of Agriculture, and in the highest years they averaged a little over $800,000. In 1913 the inspection was extended to imported meats, shipments of which were received from Australia and Argentina for the first time. In 1914 inspection was extended to include reindeer. It is estimated that about 60 per cent of the total meat supply of the United States comes under the inspection of the Federal government. Most of the remainder receives no inspection, while a small proportion is subjected to some kind of inspection by local or State officers. The animals are inspected in the yards, and in case of rejection a metal tag is placed in the ear, and this ear is left on the body so that the carcass can be identified on post-mortem examination even after it has been skinned. On the cattle-killing floor there are two inspectors working together. One examines the lymphatic glands and viscera of the carcass, while the second looks up and tags the heads, tails, and other removed portions of the carcasses which the inspector in the yards may have condemned. In the inspection of hogs one inspector stands at the point where the head is partially severed from the body and examines the lymph glands of the neck, while the second stands at the point of evisceration to examine the remainder of the carcass. Under the new law the veterinarians are known as veterinary inspectors, to distinguish them from meat inspectors, who are a new class of employees in the bureau. The ranks of the latter will be recruited from butchers, cutters, trimmers, and other men about the packing houses who have not taken a special course of education as have the veterinary inspectors, but who have had experience with meat and meat products. They secure their appointments through civil-service examination, in which experience counts 60 per cent, and are stationed in the cutting and curing rooms, canning establishments, sausage-making departments, and lard-manufacturing rooms. They examine the meat through all stages of the processes which it undergoes while in the hands of the packers.

after it has passed the veterinary inspectors. In the cutting rooms they have opportunity to detect small suppurative areas, localized bruises, gangrene, etc., which could not be seen in the gross carcass. In the curing rooms they inspect the hams as they are being changed in pickle and hams and other cuts undergoing dry curing at various stages of the process. The veterinary inspectors have access to the packing-house plants at all times, whether they are in operation or not, and any meat, although it may have successfully passed inspection at the time of slaughter, may be condemned at any subsequent time if it shows alterations which render it unfit for human food.

Statistics. According to the thirteenth census of the United States $383,249,000 were invested in the packing industry in 1909. The annual value of the product was $1,370,568,000. Since 1850 the number of establishments had increased from 185 to 1641, the number of laborers employed from 3276 to 89,728, and the average yearly wages per laborer from $376 to $575. The detailed figures published show that in Eastern cities, as Boston, New York, Newark, there has been a decided falling off in the busi-

STATISTICS OF THE SLAUGHTER, CONSUMPTION, AND EXPORT OF FOOD ANIMALS IN THE UNITED STATES, CALENDAR YEAR 1909

FROM ANNUAL REPORT OF THE BUREAU OF ANIMAL INDUSTRY FOR 1911

FOR YEAR 1909 ITEM	Cattle	Calves	Swine	Sheep	Goats	ALL ANIMALS Total meat*	ALL ANIMALS Per cent of total slaughter	ALL ANIMALS Per cent of total output
	Number	*Number*	*Number*	*Number*	*Number*	*Cwts.*		
1. Total slaughter in United States (addition of items 2 and 3)	13,682,875	6,500,562	52,002,936	14,565,714	279,042	167,294,473	100.00	99.21
2. Total commercial slaughter (Census of 1909)	12,274,235	5,368,962	36,624,419	14,036,188	160,153	134,508,611	80.40	79.77
3. Farm slaughter (Census of 1909)	1,408,640	1,131,600	15,378,517	529,526	118,989	32,785,903	19.60	19.44
4. Wholesale slaughter and packing (Census of 1909)	8,114,860	2,504,728	33,870,616	12,255,501	†33,224	103,892,790	62.10	61.61
5. Federally inspected slaughter (Bureau of Animal Industry)	7,713,807	2,189,017	31,394,896	11,350,349	†100,659	97,227,493	58.12	57.66
6. Retail commercial slaughter (subtraction of item 4 from item 2)	4,159,375	2,864,234	2,753,803	1,780,687	126,929	30,615,821	18.30	18.16
7. Exports:								
Alive	184,957	....	11,886	54,613	....	1,335,395	....	....
As meat, etc. (calculated)	284,261	....	6,322,070	37,575	....	11,294,931	6.75	7.49
8. Consumed in United States	13,398,614	6,500,562	45,680,866	14,528,139	279,042	155,999,542	93.25	92.51
9. Total output (consumption and export)	13,867,832	6,500,562	52,014,822	14,620,327	279,042	168,629,868	....	100.00
10. Total number alive April 15, 1910 (Census)	63,682,648		59,473,636	52,838,748	3,029,795	....	....	....
11. Estimated number alive Jan. 1, 1909	65,480,375		64,070,948	51,781,973	....	....	....	....
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Total per cent*		
12. Per cent of Federally inspected slaughter to total slaughter	56.38	33.67	60.37	77.93	36.07	58.12	....	....
13. Per cent of total commercial slaughter to total slaughter	89.71	82.60	70.43	96.36	57.39	80.40	....	....
14. Per cent of wholesale commercial slaughter to total slaughter	59.31	38.53	65.13	84.14	11.91	62.10	....	....
15. Per cent of retail commercial slaughter to total slaughter	30.40	44.07	5.30	12.22	45.48	18.30	....	....
16. Per cent of farm slaughter to total slaughter	10.29	17.40	29.57	3.64	42.61	19.60	....	....
17. Per cent of Federally inspected slaughter to total commercial slaughter	62.85	40.83	85.72	80.86	62.85	72.28	....	....
18. Per cent of Federally inspected slaughter to wholesale slaughter and packing	95.06	87.40	92.69	92.61	†302.97	93.58	....	....
19. Per cent of total slaughter to estimated stock on hand Jan. 1, 1909	30.82		81.16	28.13	....	....	....	....
20. Per cent of total exports to total output	3.38	....	12.18	0.63	....	7.49	....	....
21. Per cent of total output consumed in the United States	96.62	100.00	87.82	99.37	100.00	92.51	....	....
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*		
22. Per capita consumption in the United States (dressed meat)	‡ 80.34	§ 7.54	‖ 67.61 ¶ 10.06	** 6.58	†† 0.13	‡‡ 162.20 ¶ 10.06	....	....

* This column shows the estimated weight of the dressed carcasses, including lard of swine.

† For explanation of discrepancy in goats see p. 258 of the *Report of the Bureau of Animal Industry for 1911*.

‡ Beef. § Veal. ‖ Pork. ¶ Lard. ** Mutton. †† Goat. ‡‡ Total meat.

ness, while in certain cities of the Middle West, as St. Joseph, Mo., there has been a more than corresponding increase.

MEAT PRODUCTS EXPORTED FROM THE UNITED STATES IN THE YEAR ENDED DECEMBER, 1914

TAKEN FROM THE MONTHLY SUMMARY OF FOREIGN COMMERCE

	Pounds	Dollars
Beef products:		
Canned beef	30,734,748	$4,897,079
Fresh beef	31,422,463	3,899,070
Beef, pickled and other cured	23,779,449	2,371,563
Oleo oil	85,144,527	8,918,130
Hog products:		
Bacon	184,267,850	25,570,543
Hams and shoulders cured	142,398,301	20,797,130
Pickled pork	37,006,108	4,011,586
Lard	438,015,898	48,610,269
Neutral lard	21,797,521	2,429,926
Lard compounds and other substitutes for lard	63,355,911	5,686,980

NUMBER OF CATTLE, HOGS, AND SHEEP SLAUGHTERED IN EACH OF FOUR WESTERN CITIES

CATTLE

YEAR	Chicago	Kansas City	South Omaha	St. Louis
1870	141,255	....	....	71,674
1875	224,309	48,492	....	119,041
1880	495,863	50,288	....	195,841
1885	1,161,425	104,246	30,930	153,071
1890	2,223,971	548,677	322,819	277,309
1895	1,803,466	893,750	314,312	578,419
1900	1,794,397	1,092,804	516,669	488,008
1905	2,000,000	1,267,000	682,000	877,000
1910	1,741,000	1,286,000	799,000	904,000
1913	1,531,000	1,129,000	530,000	800,000

HOGS

YEAR	Chicago	Kansas City	South Omaha	St. Louis
1870	768,705	....	....	293,694
1875	2,329,467	47,560	....	501,840
1880	5,664,365	523,557	....	1,069,915
1885	5,140,089	1,557,556	58,948	666,048
1890	5,678,128	2,306,944	1,397,676	694,320
1895	5,784,670	2,171,357	1,087,716	834,862
1900	6,656,881	2,827,128	2,162,612	1,643,411
1905	6,291,634	3,141,937	2,121,724	1,878,258
1910	4,723,925	2,201,642	1,656,246	1,859,241
1913	5,898,291	2,298,799	2,161,771	2,148,091

SHEEP

YEAR	Chicago	Kansas City	South Omaha	St. Louis
1870	233,142	....	....	82,828
1875	175,344	7,585	....	87,895
1880	179,292	14,326	....	112,447
1885	743,321	106,046	10,577	129,467
1890	1,252,813	199,662	61,722	106,768
1895	2,932,093	577,419	94,840	391,515
1900	3,061,631	636,018	728,523	359,034
1905	3,380,000	962,000	939,000	598,000
1910	3,736,000	1,189,000	1,291,000	695,000
1913	4,453,000	1,598,000	1,637,000	904,000

Bibliography. The thirteenth census contains many statistics and also a good account of slaughtering and meat-packing methods in the United States. Consult also Philip Armour, in Depew, *One Hundred Years of Commerce in the United States* (New York, 1895); J. O. Armour, *The Packers, the Private Car Lines, and the People* (Philadelphia, 1906); William Douglas and Sons, *Encyclopedia of Beef and Pork Packing* (Chicago, 1912); *Report of the Commissioner of Corporations on the Beef Industry* (Washington, 1905). See ABATTOIR.

PACKSADDLE. A device for the transportation of cargo on the back of an animal. The object sought in the design of any packsaddle is the uniform distribution of the weight of the cargo over that portion of the animal's body anatomically suited to carrying a burden, so that the saddle will ride with little motion and without friction against the bearing surface of the animal's body. An efficient system must also provide a means of readily changing the bearing surface so as to conform exactly to the particular conformation of the animal on which the saddle is to be used and of relieving undue pressure, discovered under load, at any particular point, in order to prevent bunches (a puffing up of the skin) and subsequent sores.

In the United States there are four recognized types of packsaddles: (1) the crosstree or sawbuck, (2) the Moore packsaddle, (3) the English packsaddle, (4) the aparejo. The saddle best fulfilling the principles enunciated above is the American aparejo, used by the United States army pack trains and, with the addition of special steel frames, by the United States mountain artillery (q.v.).

The crosstree, as the term implies, consists of two saddle boards, shaped somewhat similar to the McClellan saddletree, connected at front and rear (pommel and cantle) by crosspieces shaped like the letter X, termed the cruz (cross), or forks of the saddle, supplied with a breast strap, breeching and quarter straps, holding cincha, and latigo, or tightening strap, accompanied by a saddle pad or blanket. For the carrying of supplies two methods are used: first (the original method), the employment of wicker baskets and panniers made of canvas or leather, constructed so as to fit over the forks of the saddle and strapped to the animal by the aid of cincha and latigo; second, the employment of sling and lash rope. This latter method has a more general application, on account of its relative lightness and cheapness, and is used by trappers, miners, prospectors, small hunting parties, etc. See PACK TRANSPORTATION.

The Moore packsaddle, designed by a former chief pack master of the United States army, resembles a combination of the sawbuck and aparejo. In competition with the aparejo it was finally declared unsuited for severe field service.

The term "English packsaddle" is employed to designate the general type used by mountain artillery among European nations. This packsaddle consists essentially of a steel saddletree and two pads, stuffed with hair or other material, on which rest frames designed to carry the parts of the gun, ammunition carriers, etc. There are many variations of this type, but all have a common defect, viz., lack of ready means of easing undue pressure at a particular point and thus preventing bunches or sores under load, the advantage of an easy means of relieving such pressure being possessed only by the American aparejo.

The aparejo (q.v.) packsaddle has been officially adopted for use by all pack trains, mountain artillery, machine-gun companies, and engineer packs in the United States army. Consult bibliography under PACK TRANSPORTATION.

PACK TRANSPORTATION, or PACKING. This is the common English term for the transportation of material by men or animals where the absence of roads precludes the use of vehicles. The oldest of pack animals is man himself, but in various parts of the world he has lifted the burden from himself to the backs of the horse, mule, donkey, dog, yak, sheep, llama, camel, or elephant.

Man. Most of the savage races, particularly those of a low culture, balance loads directly on their heads, usually with no other aid than a small pad on top of the skull. This method of bearing burdens has its highest development in Africa. As we advance up the scale of civilization we find that the load is shifted to the back and attached by a harness of more or less complexity. Perhaps the simplest harness is the tump line used by certain of the Indian tribes of North America. This consists in its primitive form of a long leather strap about 2.5 inches wide in the centre and tapering towards each end. The duffel is rolled in a blanket which is ingeniously tied by the ends of the thong, leaving the broad centre of the strap as a loop; this loop is placed across the head above the forehead, and the burden of the pack is allowed to rest on the back just above the hips. While exceedingly tiring to a beginner the tump line distributes the muscular strain, leaves the arms free, and has the added advantage that in an emergency a single motion of the head casts off the pack.

Between the tump line and the high specialized pack of the modern infantryman lie many varieties of carrying harness of varying degrees of complexity. A favorite form, known in the United States as pack harness, or pack straps, has two straps that go around the shoulders, usually connected in front by a breast strap, and in the rear three straps, two horizontal and one vertical, to attach the load; all these are made adjustable by buckles. A form that is found in widely scattered parts of the earth is shaped like a crude wooden chair without front legs; when attached to the bearer the back of the chair protects him, the seat bears the weight and the hind legs serve to raise the load when he squats to rest. This contrivance is carried either by shoulder straps or tump line.

Trained packers can carry heavy loads for short distances, but for continuous work across broken country 60 pounds is a good pack; few white men care to carry more than 40, although it is related that the trappers in the Astoria country used to carry 100 pounds of fur 10 hours a day when bringing their winter catch to the fort.

Horse, Mule, and Donkey. Next to man himself the favorite pack animals are the horse, mule, and donkey. The art of placing loads on the backs of these animals had probably reached its greatest development in the mountains of western North America, where the packers boast that they will transport any object that does not weigh over 350 pounds. Saw-mill and mining machinery, small safes, and even pianos are all handled, if not with ease, at least with expedition.

Broadly speaking, all packsaddles for these animals belong to one of two types, the aparejo (q.v.) and the sawbuck. See PACKSADDLE. The aparejo has a larger bearing surface and thus enables the animal to carry a load with greater ease, is capable of being adjusted so as to relieve the pressure on bunches and so prevent sores, but suffers from the disadvantage of having to be individually fitted to each animal, whereas the sawbuck can be set on any animal with no adjustment save to the breastband and crupper; the aparejo is expensive, the sawbuck cheap; and *alforjas* or packsaddle bags can be used on the sawbuck, the loops of the bag being hung over the horns of the saddle.

In making up his load the packer endeavors to have his two side packs not only of the same weight but also as nearly the same size as possible. When the side packs do not make a load for the animal a top pack is added, but this is kept as low as possible. In order to keep the animal from moving he is usually blinded by a leather screen (*parpados*) dropped over his eyes while being packed. Side packs are held in place on the saddle by light ropes known as slings, the top pack set in place, and the whole covered with a sheet of canvas called the *manta;* the packer then throws the over-all lash, which binds animal, saddle, and pack into a single unit. The final or over-all lash is made with a half-inch rope about 40 feet long, to the end of which is attached a cinch terminating in a hook.

The best, most commonly used, and most intricate of all methods of lashing a pack is known as the diamond hitch. There are two main varieties of this hitch, known as the single diamond and double diamond, according as they require one or two men to throw them. This hitch has a loop of rope around each side pack and completely around the animal and pack, and is so arranged that the final pull tightens all three loops. The name is derived from the fact that the rope forms a diamond-shaped figure on top of the pack.

The squaw hitch is used, as its name implies, chiefly by Indians, while the so-called Oregon wrap is useful in attaching a pack to a bare-backed animal.

The aparejo with the aid of various special attachments is used in military service for the transportation of field radio stations, mountain howitzers, etc. See MOUNTAIN ARTILLERY.

Dog. Previous to the introduction of the horse by the Spanish conquistadores, and indeed for many years after, the Indians of the plains of western North America used dogs as pack animals, and this use still persists during the summer months among the woodland Indians to the west of Hudson Bay. The pack is tied without the use of a saddle, and when tepee poles are carried they are tied on each side of the pack and the butts permitted to drag.

Yak and Sheep. The use of these as pack animals is practically confined to Tibet. The yak is packed either with or without a saddle, according to the nature of the load. When a saddle is used it is of the sawbuck type. Sheep are loaded with from 20 to 30 pounds tied directly to the animals and can carry their load across country that is too rough for the heavily built yak.

Elephant. The elephant is loaded when in a kneeling position, his back being covered with a heavy mattress that serves not so much to distribute the load as to protect him from chafes and bruises.

Camel and Dromedary. These animals are packed both with and without a saddle, the usage varying with the region and type of the load. When a packsaddle is used it is a local variant of the sawbuck.

Llama. This relative of the camel, used extensively in South America as a pack animal, carries his load of about 125 pounds with no protection except that afforded by his own wool and a light pad. See CAMEL; DROMEDARY; LLAMA; YAK.

For a history of pack transportation and a detailed description of various packsaddles, consult H. W. Daly, *Pack Transportation*, published by Quartermaster's Department, U.S.A. (Washington, 1910); *Drill Regulations for Mountain Artillery, United States Army* (ib., 1908); C. J. Post, *Horse Packing* (New York, 1914).

PACO. See ALPACA.

PACTO'LUS (Lat., from Gk. Πακτωλός, *Paktōlos*). The ancient name of a river of Lydia in Asia Minor, believed to be the present Sarabat, which rises on the north slope of Mount Tmolus, now called Boz Dagh. It flows northwest past Sardis (Sart) and empties into the Hermus River. It is nowhere more than 10 feet broad and 1 foot deep. The sands or mud of Pactolus once contained a good deal of gold and were regarded as the source of Crœsus's vast wealth, but as early even as the time of Strabo Pactolus had ceased to yield any of the precious dust. At present peasants living in the vicinity of the Boz Dagh wash the river gravels for gold and make occasional finds.

PACU'VIUS, MARCUS (c.220–c.132 B.C.). A Roman writer of tragedies, nephew of Ennius (q.v.). He was born at Brundisium, Italy. Repairing to Rome, he soon acquired fame by his skill in poetry and painting. One of his pictures was hung in the temple of Hercules in the Forum Boarium at Rome. His finest works were his tragedies, which showed eloquence and refinement. Fragments of 13 of these, as well as of a *prætexta*, or tragedy with a typically Roman plot, have been preserved. These have been collected by Ribbeck, *Scænicæ Romanorum Poesis Fragmenta* (3d ed., Leipzig, 1897). Consult: W. Y. Sellar, *The Roman Poets of the Republic* (3d ed., Oxford, 1889); Martin Schanz, *Geschichte der römischen Litteratur*, vol. i, part i (3d ed., Munich, 1907); J. W. Duff, *A Literary History of Rome* (London, 1909). See LATIN LANGUAGE; LATIN LITERATURE.

PA'DAN A'RAM. See MESOPOTAMIA.

PADANG, pȧ-däng'. The capital of the Dutch possessions on the west coast of Sumatra. It is situated amid picturesque mountain scenery near the centre of the west coast (Map: East Indies, B 6). Its Malay inhabitants live mostly in bamboo huts, but the Europeans and Chinese have well-built houses of stone and wood, and there are several churches, schools, a hospital, large warehouses, and government workshops. The town is the terminus of a railroad line into the interior and has a lively trade with Java and the other East Indian islands as well as with Europe, exporting coffee, nutmegs, copra, tobacco, gum, cane, and hides. It is the station of a United States consular agent. Pop., 1905, 37,875.

PADDLE. A wooden implement with a wide flat blade at one end or both, used by canoeists in place of oars. It is held in the hands, not rested in a rowlock, and is dipped into the water with a nearly vertical motion. The double-bladed paddle is frequently used in canoes, though many sportsmen prefer the single blade, which is worked over one side of the canoe, the steering being accomplished by giving a particular twist to the paddle at the end of each stroke. The fact that the paddler faces the bow of his boat gives him a certain advantage over the oarsman, whose back is to the bow, especially in threading narrow streams. See CANOE.

In the Polynesian islands the paddles of tribal chiefs are highly decorated by carving of incised patterns on the blade and of heads, human figures, and other ornaments on the handles. Thus adorned they serve as insignia of office and badges of pedigree rather than as objects of use. The paddles of various Alaskan tribes are painted, not carved, with eyes, birds' heads, and other animistic patterns.

PADDLEFISH (so called from the form of the snout). A fish (*Polyodon spathula*) of the Mississippi River and its tributaries, which has the general appearance of a rather slender catfish, but is a ganoid with a skeleton chiefly cartilaginous. It is about 5 feet long, has a smooth dark-green skin without scales and a long bony snout containing fine teeth, with which it digs up the mud at the bottom of sluggish streams in search of the minute animals upon which it feeds. It has much the habits of a catfish, but inferior flesh, and is known as the duck-billed or spoon-billed catfish or spadefish, both names referring to the spatulate form of its snout. It represents the order Chondrostomi of the subclass Teleostomi and the family Polyodontidæ and is closely allied to the sturgeons. A similar species inhabits China. See Plate of STURGEONS, PADDLEFISH, AND BOWFIN.

PADDLE WHEEL. An appliance in steam vessels by which the power of the engine is made to act upon the water and produce locomotion. It consists of a skeleton wheel of iron, on the outer portion of whose spokes are fixed flat boards, called floats or paddles, which beat upon the water and produce continuously the same effect as is given in an intermittent manner by the blades of oars. The use of paddle wheels in conjunction with steam as a motive power dates from about the commencement of the nineteenth century, but the employment of the paddle wheel itself is as ancient as the time of the Egyptians. A specimen is also known to have been tried in Spain in the sixteenth century.

In the usual form of paddle wheel, called the radial, the floats are fixed, and it will be seen that a certain loss of power is involved, as the full force of the engine on the water is experienced only when the float is vertical, since when the floats enter or leave the water the power is partly employed in depressing or lifting the particles of water.

To overcome the drawbacks to the radial wheel there was devised early in the nineteenth century the feathering paddle wheel, in which the floats are mounted on axes and are connected by rods with a common centre, which revolves upon a pin placed eccentrically to the axis of the paddle wheel. By this method the floats are kept, while immersed, at better angles to the surface of the water. Paddle wheels have been almost entirely superseded by screw propellers (see SCREW PROPELLER) on all vessels except river, sound, and lake boats. See SHIP and SHIPPING; SHIPBUILDING; STEAM NAVIGATION.

PADDY BIRD. See JAVA SPARROW.

PAD'EMEL'ON, or PADDYMELON (Australian name). A small wallaby or kangaroo (*Macropus thetidis*) of New South Wales. It inhabits scrubby districts, and is hunted both for its flesh and its hide. Several other species in Australia, New Guinea, and Tasmania belong to this genus, which is characterized by the absence of hair on the muffle.

PADERBORN, pä′dẽr-bôrn′. A town in the Province of Westphalia, Prussia, situated at the source of the Pader (hence the name of the town), 15 miles south by west of Detmold (Map: Prussia, C 3). The modern buildings date almost entirely from the great fire of 1875. The cathedral, which was built above the source of the Pader mainly in the thirteenth century, and which contains parts of the original twelfth-century structure, was completely restored in 1891–93. It is Gothic in style and contains among other treasures the silver coffin of St. Liborius, which was substituted for the original one coined into dollars by Duke Christian of Brunswick in 1622. The Busdorfkirche, of the fourteenth century, the eleventh-century chapel of St. Bartholomew, and the Rathaus, dating from the fifteenth century and recently restored, are noteworthy buildings. The chief educational institutions are a Gymnasium, an episcopal faculty of theology and philosophy (taking the place of the university, which was closed in 1819), seminaries for priests and teachers, an institute of midwifery, and a Realschule. The town has railway shops, manufactures of glass, soap, and tobacco, distilleries, flour mills, and carries on trade in fruit, cattle, and wool. In the vicinity are alkaline and sulphur springs. Pop., 1900, 23,502; 1910, 29,441, chiefly Roman Catholics. Paderborn first came into notice when Charlemagne held a diet there in 777, and 18 years later nominated the first bishop. It was surrounded with walls in the eleventh century, and in the Middle Ages enjoyed considerable political independence as a member of the Hansa. For its early adoption of Reformation principles it was forcibly deprived of its privileges in 1604 by the Prince-Bishop Theodore of Fürstenburg. The bishopric, founded in 795 by Charlemagne, was secularized in 1802. Consult W. Richter, *Geschichte der Stadt Paderborn*, vols. i, ii (Paderborn, 1899–1903).

PADEREWSKI, pä′de-rĕf′skê, IGNACE JAN (1860–). A Polish pianist and composer. He was born in the Province of Podolia, Russian Poland, Nov. 6, 1860. When only three years of age he showed great fondness for music, and at seven was placed under a teacher, making such rapid progress as a pianist that in five years he gave public recitals. He studied under Raguski at the Warsaw Conservatory, in which he was himself a professor from 1879 to 1881. Then he went to Berlin, where he studied composition with Wuerst and Urban. In 1884 he went to Leschetizky and, making his formal début in Vienna (1887), was at once placed in the foremost rank of pianists. In 1890 he created a furor in London by his marvelous playing, and in 1891 made the first of his many phenomenally successful tours of America. In 1900 he established a prize bearing his name, which is awarded every three years, for the purpose of encouraging American composers. As a virtuoso pianist Paderewski must be placed among the very greatest performers that the world has yet seen. In 1909 he accepted the post of director of the Conservatory of Warsaw. His famous attempts to win laurels as a composer were hardly successful. The most ambitious effort in this direction is his opera *Manru* (Dresden, 1901; New York, 1902). A second opera, *Sakuntala*, has remained manuscript. Paderewski also wrote a symphony in B minor, a piano concerto in A minor, a trio, a piano sonata, a sonata for piano and violin. Of his works for piano the *Minuet* has become famous. Consult E. A. Baughan, *Ignace Paderewski* (London, 1907).

PADIHAM, păd′ĭ-ham. A manufacturing town and urban district in Lancashire, England, on the Calder, 3 miles west of Burnley. The fifteenth-century church of St. Leonard is notable. Padiham's industries comprise cotton mills, collieries, and stone quarries. Its parish church dates from the fourteenth century; it has an anciently endowed national school. Pop., 1901, 12,200; 1911, 13,635.

PADILLA, pȧ-ᴅēl′yȧ, JUAN LÓPEZ DE (?1484–1521). A popular hero of Spanish history. He came of a noble family of Toledo, was commandant of Saragossa in 1518 and administrator of his native city in 1520. While so employed a formidable rebellion, caused by the excessive taxes which the Emperor imposed on the Spaniards to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out among the towns (*comunidades*) of Castile, and the rebels, who were known as *comuneros*, called upon Padilla to put himself at their head. Padilla for a short time was all-powerful and formed a new junta to carry on the government. He was successful in a number of enterprises undertaken against the Royalist party, but on April 23, 1521, was completely beaten by the Royalists at Villalar. This conflict decided the fate of the rebellion and of Padilla himself, who was taken prisoner and on the following day beheaded.

His wife, MARÍA PACHECO, rallied the wreck of the rebel army and for a long time held the castle of Toledo against the Royalist army, and after its fall in February, 1522, retired to Portugal, where she died in 1531. The deeds of Padilla and his wife have often been celebrated in Spanish song.

PADISHAH, pä′dê-shä′ (Pers. *pādishāh*, king, from *pād*, Skt. *pati*, master, protector, from *pā*, to protect + *shāh*, OPers. *xšāyaθiya*, king, connected with Av. *xši*, Skt. *kṣi*, to rule). One of the titles of the Sultan of the Ottoman Empire and of the Shah of Persia. Formerly this title was accorded only to the kings of France among European monarchs. It was subsequently allowed to the head of the house of Austria and still later, by a special article in the Treaty of Kutchuk-Kainarji (1774), to the Autocrat of All the Russias. Of late it has been accorded to the monarchs of all the great European nations, and even to those of secondary states.

PADOVANINO, pä′dô-vȧ-nē′nô, IL. The name commonly applied to the Venetian painter Alessandro Varotari (q.v.).

PADUA, păd′û-ȧ (Lat. *Patavium;* It. *Padova*). The capital of the Province of Padua, Italy, situated 22 miles by rail west-southwest of Venice (Map: Italy, D 2). Several arms of the Bacchiglione, here canalized, flow through the city and are crossed by a number of old Roman bridges. The city lies in a compact shape in one of the richest gardened plains of Italy. The ancient, narrow, crooked streets are generally arcaded. The arcades, however, are being removed gradually to accommodate the increasing traffic. There are seven city gates.

The cathedral is of no particular interest, but its baptistery is a handsome brick conception of the twelfth century. The fine and immense San Antonio Church is identified with St. Anthony, the patron saint of the city. It dates from the middle of the thirteenth century and was restored about 500 years later. The saint is entombed here. The edifice has six domes and is fashioned after the Byzantine St. Mark's of Venice, with Gothic features added. The most valuable of its numerous contents are a monument by Al. Vittoria; a collection of goldsmith's work of the Renaissance period; a bronze candelabrum by A. Riccio, by whom are also valuable biblical reliefs in bronze; the high altar by Donatello; the exquisite white and gold decorations on the ceiling; the ambitious Renaissance Cappella del Santo; and a madonna by A. Boselli. Before San Antonio stands Donatello's splendid equestrian bronze statue (1453) of the Venetian general Erasmo de' Narni, called Gattamelata.

Another fine church is the spacious Santa Giustina, begun by Riccio. Its façade is brick, with one of the many noble flights of stairs for which Padua is famous. Domes and cupolas add to the impressiveness of the edifice. In the interior are the fine "Martyrdom of St. Justina" by Veronese and handsome choir stalls. The adjoining cloister is used as barracks. In the northeastern part of the city are the Madonna dell' Arena and the Eremitani. The former is a fine chapel dating from the beginning of the fourteenth century. It is situated in an attractive garden and is remarkable for its frescoes by Giotto, most of them in a good condition. The Augustinian Eremitani, dating from the thirteenth century and restored in 1880, contains scarcely less valuable and important mural paintings by Mantegna and other members of the school of Squarcione. The Mantegna pictures were painted between 1450 and 1460, the life of St. James furnishing a part of the subjects. There are also found here, in the sacristy, a "Pietà" by Canova and a "John the Baptist" by Guido Reni.

Among the notable palaces of Padua is the Palazzo della Ragione, belonging to the twelfth century, with a vast mediæval hall (*salone*) about 270 feet long, 90 feet wide, and 78 feet high. Donatello's celebrated wooden horse is here. The Loggia del Consiglio is a charming example of the early Renaissance—an arcade reached by majestic stairs. In the vicinity are found a statue of Victor Emmanuel II and a column bearing a Lion of St. Mark. Padua possesses also a monument to Petrarch, modern statues of Dante and Giotto, both by Vela, a bronze monument to Cavour, and a statue of Garibaldi. The Scuola del Santo, occupied by the Brotherhood of St. Anthony, has three fine mural paintings by Titian. The chapel San Giorgio near by has numerous excellent frescoes by Altichieri and J. Avanzi. Among the objects of interest in the city is Dante's house, in front of which is an ancient tomb containing, according to tradition, the ashes of Antenor, the legendary founder of Padua.

On the Via dei Servi, the main business street, stands the university (q.v.), far famed as a seat of learning in mediæval times. It occupies an edifice known as Il Bò, distinguished by a court with attractive colonnades. Padua has a celebrated café, the Pedrocchi, almost entirely of marble, with noble halls and columns, the scene of student uprisings against the Austrians. The municipal museum, in a building reconstructed in the latter part of the nineteenth century by Boito, has an attractive façade and contains the city library (200,000 volumes), the picture gallery, archives, and an interesting monument of the Volumnii. The picture gallery is not important. Its best work is Romanino's Madonna, an altarpiece. In the southern part of the city lies the spacious Piazza Vittorio Emanuele, beautified with trees and embellished with the statues of 82 celebrated persons who have been associated with the city. Some of the marbles are by Canova. The piazza is the lively scene of the annual fair which begins on St. Anthony's festival, June 13.

The Botanic Garden of Padua, which is connected with the university, is well known as the oldest in Europe, having been established by the Venetian Republic in the middle of the sixteenth century. It has some exotic trees which have long been celebrated and are associated with certain of Goethe's scientific investigations here. Also connected with the university are an observatory and a large and valuable library. There are in the city an archiepiscopal seminary, a lyceum and other high schools, a technical industrial school, an agricultural school, an industrial art school, and a silkworm-breeding institution. The industries of Padua include foundries, farm-machinery works, an automobile factory, chemical factories, distilleries, etc. The city is the centre for the trade of Venetia, cattle, wine, oil, and grain being chiefly dealt in. It is particularly famous for its fruit. Canals connect Padua with the Adige, the Brenta, and the Adriatic. Population of the city in 1901, 50,085; the commune in 1901 had 82,281 inhabitants and, in 1911, 96,230.

Padua claims its origin from the time of Troy. In the height of Rome's glory it was the most important town in northern Italy. It was sacked by the Goths and the Huns. Charlemagne wrested it from the Longobards. In the middle of the thirteenth century it was the capital of the cruel tyrant Ezzelino (IV) da Romano. Later it was for a time a republic, then passed under the rule of the Carrara family and became the object of conquest on the part of Venice, to which it fell in 1405 and whose fortunes it afterward shared. Livy and Mantegna were born here. In art history Padua is prominent. Mantegna shed his glory upon the city, and the influence of the Squarcione school, with which he was associated, is traced throughout northern Italy. Giotto, Donatello, and Fra Filippo Lippi also did much work in Padua. Consult: Cappelletti, *Storia di Padova* (Padua, 1875); Volkmann, *Padua* (Leipzig, 1904); G. C. Williamson, "Padua," in *Cities of Northern Italy*, vol. ii (Boston, 1906); Cesare Foligno, *Story of Padua*, in "Mediæval Towns Series" (New York, 1910).

PADUA, University of. One of the oldest and most famous of European universities. It had its inception in the emigration from the University of Bologna in 1222 of a large number of students, owing to difficulties with the town authorities. The School of Martinus for the study of jurisprudence at Padua, however, is mentioned as early as 1190. The restless students found Padua as unaccommodating as Bologna and in 1228 entered into a contract to emigrate to Vercelli, that commune promising for the accommodation of students 500 houses and other privileges. This contract was carried out only in part, and the university at Padua was not wiped out entirely. At first jurisprudence constituted the principal study, but soon the liberal arts came into vogue. During the tyrannical reign of Ezzelino (IV) da Romano (1237-59) the university lost its prestige and was almost ruined, but with his death the town endeavored to improve its condition. In 1260 a code of statutes, modeled after those of Bologna, was drawn up, two universities, the Ultramontani and the Citramontani, were established, and the grammatical, rhetorical, and medical studies instituted. The fame of the university soon rivaled that of Bologna. In 1282 the Paduans attempted to force new statutes, prepared by them, on the university. This was vigorously resisted by the university and Pope Nicholas IV. An attempt was even made to transfer the university to some other place, but the difficulty was settled in 1290. In 1363 Pope Urban V instituted theology as a *studium generale*. In the same year the first college was founded, the number increasing gradually henceforth. After 1390 the university received many foundations for poor scholars, and in 1390 Francesco Carrara presented it with its first building. In the fifteenth century it far outranked Bologna in renown. Humanism obtained a strong foothold here and, besides the professional studies, mathematics, modern languages, fine arts, and knightly exercises were eagerly pursued. At Padua were established the first botanical garden and anatomical theatre. The university became a favorite place with the Germans, there being, in 1564, 200 of them under the faculty of law. During the seventeenth century the fame of the institution gradually declined. In 1613 the complaint was made that there were only 1400 students. Still there were about 100 annual promotions in jurisprudence. At that period the university was famous for the licentiousness of the students, which hastened the decay of the once flourishing institution. In the beginning of the eighteenth century Augustin Leyser laments its total ruin. Under the Austrian régime and later under the Italian government strenuous efforts were made to reestablish the former fame of the university, and its regeneration has proceeded gradually. During the troublous period of 1848–50 the university was closed. In 1912–13 the University of Padua consisted of the following schools and faculties: (1) law, (2) medical-surgical, (3) mathematical-natural science, (4) philosophy, (5) engineering, (6) pharmacy. The attendance was over 1500. The library contained 200,000 volumes and pamphlets and 2356 manuscripts. The university also includes a number of clinics, an observatory, a botanical garden, and a number of museums.

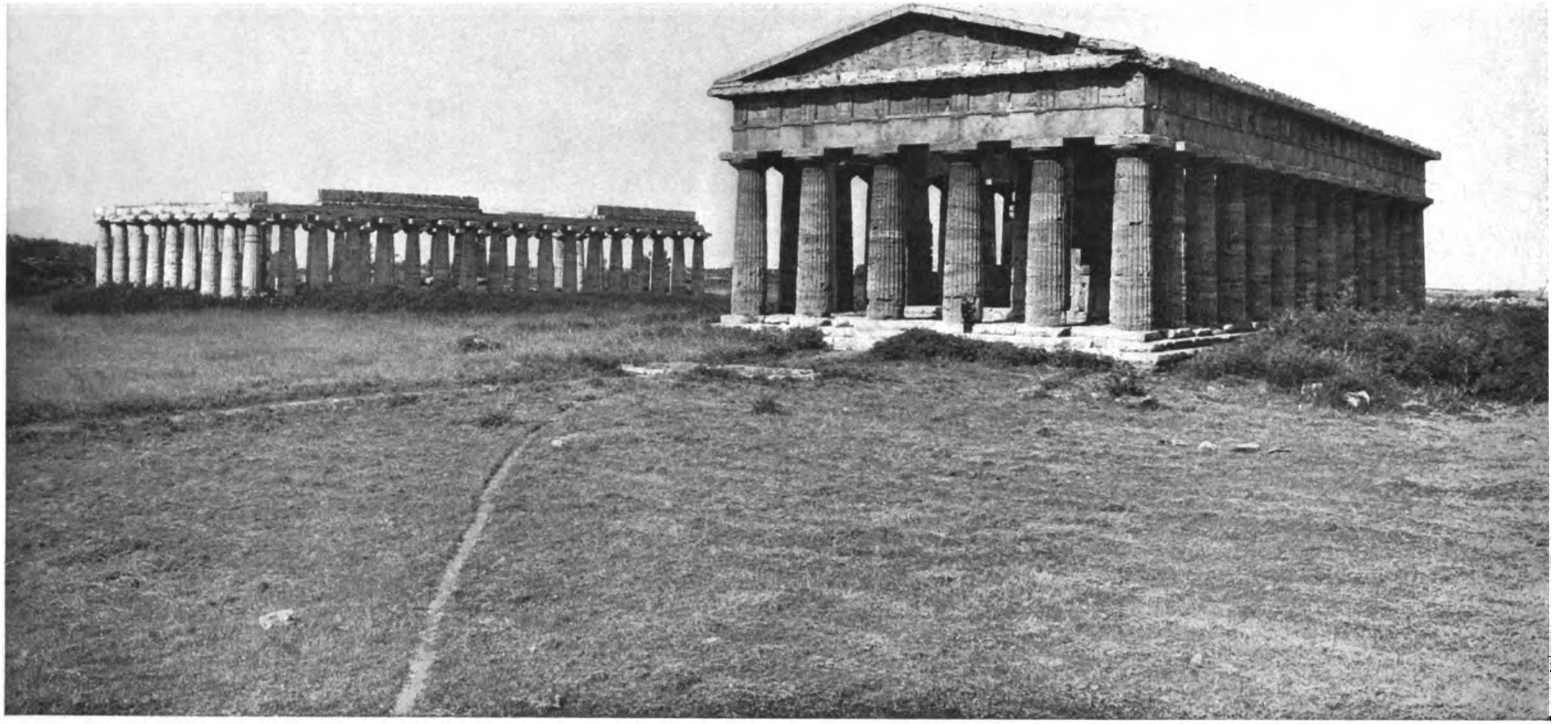
PADUCAH, pȧ-dū′kȧ. A city and the county seat of McCracken Co., Ky., 165 miles southeast of St. Louis, Mo., at the confluence of the Ohio and Tennessee rivers, the terminus of several river packet lines, and on the Chicago, Burlington, and Quincy, the Illinois Central, and the Nashville, Chattanooga, and St. Louis railroads (Map: Kentucky, B 5). It has a United States government building, a Carnegie library, hospitals, and a number of public parks. The city is in an agricultural, mineral, and timber region, controls large lumber and tobacco interests, besides an important wholesale trade, and has extensive manufactures of lumber products, furniture, brick, potter's ware, tobacco, wagon material, cordage, clothing, flour, and foundry and machine-shop products. The building of steamboats is carried on and large dry docks have been erected. The government is vested in a mayor and four commissioners. The school board is independently chosen by popular vote. Paducah was laid out in 1827, incorporated as a village in the following year, and received a city charter in 1856. In September, 1861, it was occupied and fortified by General Grant, and on March 25, 1864, then having a garrison of about 800 men under Hicks, it was unsuccessfully attacked by General Forrest with a force of 5000. Pop., 1900, 19,446; 1910, 22,760; 1914 (U. S. est.), 24,170.

PÆ′AN (Lat., from Gk. παιάν, *paian*, hymn in honor of Apollo, from Παιάν, *Paian*, Παιών, *Paiōn*, epithet of Apollo). An ancient Greek god of healing. Pæan appears in Homer and later poets down to Æschylus as a personal god, a divine physician, invoked to cure disease and also to avert threatened destruction from other causes. From the middle of the fifth century B.C. we hear little of this god, and Pæan becomes a surname of Apollo (q.v.), as the averter of disease and destruction. The hymn for deliverance, addressed probably originally to the god Pæan, with its refrain *ἰὴ Παιάν*, was also transferred to the worship of other gods, and became the name for a recognized division of Greek choral lyric poetry. It was sung either in solemn procession or in a stately dance around an altar, especially of Apollo, though sometimes in connection with the worship of Dionysus, Asclepius, and others. We find the word used also to denote a prayer or hymn accompanying the libation at a sacrifice, or sung to the gods with the libation at the symposium or at the marriage feast. As a prayer for safety it was naturally chanted before the battle and, indeed, before any undertaking where danger was anticipated. The refrain seems also to have become a shout of victory, as expressing thanksgiving for deliverance, and thus the pæan is also the name for the hymn sung at the processions and the sacrifices in celebration of victory; hence the modern use of the term for a song of joy or triumph. Pæans were written especially by Bacchylides and Pindar. Consult: Arthur Fairbanks, *A Study of the Greek Pæan* (New York, 1900); H. Usener, *Götternamen* (Bonn, 1896); L. R. Farnell, *Cults of the Greek States*, vol. iv (Oxford, 1907).

PÆ′DOGEN′ESIS. See PARTHENOGENESIS.

PÆLIGNIAN, pē-lĭg′nĭ-an. See ITALIC LANGUAGES.

PÆO′NIUS (Lat., from Gk. Παιώνιος, *Paiōnios*). A Greek sculptor of the latter part of the fifth century B.C. He was a native of Mende in Thrace, which was settled by Ionians, and is known by his statue of Nike (Victory), executed for the Messenians and the Naupactians and erected as a trophy at Olympia, probably about 420 B.C., to commemorate, probably, the battle of Sphacteria. The statue stood on a triangular pedestal some 30 feet in height, and represented the goddess as in full flight towards the earth. The feet barely touch the pedestal, the support being afforded by the flowing drapery, which in its light folds suggests admirably the rush of the goddess through the air. Pausanias says that Pæonius also made the sculptures in the east pediment of the temple of Zeus at Olympia, but this seems to be due to a misunderstanding of the inscription on the base of the Nike, in which the artist claims to have been the victor in making the figures which stood on the extremities of the gables. Consult E. A. Gardner, *A Handbook of Greek Sculpture* (London, 1911).



PÆSTUM

RUINS OF THE TEMPLE OF NEPTUNE (RIGHT), AND THE SO-CALLED BASILICA

PAËR, pȧ-ār′, Ferdinando (1771–1839). An Italian composer, born in Parma. He was appointed chapelmaster at Dresden in 1801, Imperial composer to Napoleon in 1807, and was director of the Italian opera at Paris in 1812–27. Besides a number of overtures and cantatas he was composer of 43 operas (the best is *Camilla*, 1799) which have long been forgotten. He is of interest more for the part he played in the musical life of his day, as shown by his appointments, and his rivalry with Rossini, his successful competitor for public favor and for a time a joint conductor with him at the Théâtre Italien. He received the cross of the Legion of Honor in 1828, was elected to the Academy in 1831, and the year following became conductor of the Royal Chamber music. He died in Paris.

PAESIELLO. See Paisiello.

PÆS′TUM (Lat., from Gk. Παίστον, *Paiston*, earlier Ποσειδωνία, *Poseidōnia*). An ancient Greek city of northwestern Lucania in southern Italy, in the present Province of Salerno (the site is now called Pesto) (Map: Italy, E 4). Founded under the name Posidonia, by Trœzenians from Sybaris, probably in the latter part of the seventh century B.C., it does not appear prominently in the history of Magna Græcia, but its temples show it must have enjoyed considerable prosperity. About 400 B.C. it was captured by the advancing Lucanians, who, however, allowed the ancient inhabitants to remain and even to mourn their lost glories at an annual festival. With the rest of the region it submitted to Rome, and in 273 B.C. was made the seat of a colony, but in the time of Strabo was reputed unhealthy and gradually fell into neglect. In Roman days, however, the city was long famous for its roses. In the ninth century the town was sacked by the Saracens, and after that the site seems to have been abandoned and now is occupied only by a few houses and the fine ruins of three temples, commonly called the temple of Poseidon, the Basilica, and the temple of Ceres. The first named, built most probably early in the fifth century B.C., is a hexastyle peripteros and is one of the most perfectly preserved of all Greek ruins. The so-called Basilica, with its extraordinary enneastyle (nine-column) ends and its central line of interior columns, appears to have been a temple for two deities, perhaps Ceres and Proserpina, and is of more archaic design, dating from the early sixth century. The "Temple of Ceres" is of nearly the same date as the Basilica; it is a hexastyle peripteros and was probably a temple of Vesta. All three are in the Doric style, built of coarse stone which was stuccoed and painted. Consult Allan Marquand, *Greek Architecture* (New York, 1909), and K. Baedeker, *Southern Italy and Sicily*, pp. 198–201, with plan (16th Eng. ed., Leipzig, 1912). See Architecture, *Greece*.

PÆSTUM, Gulf of. See Salerno, Gulf of.

PAEZ, pä′ās. A mountain tribe of Colombia, occupying about 20 villages in the high Central Cordilleras, westward from Bogotá. They are believed to be the principal modern representatives of an ancient group of allied tribes, hostile to the more civilized Chibcha (q.v.) and constituting a distinct linguistic stock. They are hunters and go nearly naked in spite of the cold, but wear hats woven from reeds or bark. They also weave mats and cloth from maguey fibre, and have some skill in hammering gold into ornaments. They burn the houses in which either a death or a birth occurs. They number about 2000. Consult D. G. Brinton, *The American Race* (New York, 1891).

PAEZ, José Antonio (1790–1873). A Venezuelan soldier and political leader, born at Acarigua in the old Province of Barinas. He was a mestizo, and passed his early life as a herdsman on the llanos of the Apure. On the outbreak of the War for Independence he led a body of his half-savage comrades to join the patriot ranks and soon made his name a terror to the Spaniards. His most important victory was that of Carabobo in 1821, when he defeated the Spanish General Latorre and so assured the independence of Colombia. The next year he was given the chief military command in the Department of Venezuela, and in 1823 drove the Spaniards from Puerto Cabello, their last foothold in the Republic. In 1830 Venezuela, under his influence, seceded from Colombia, and in the following year he was elected its first President. At the end of his term in 1835 he was succeeded by Dr. José Vargas, during whose administration there were two attempts at revolution. Both were quickly suppressed by Paez, who in 1839 again became President and served until 1843. During the war between the Creoles and the colored people in 1846 Paez was made Dictator, but at the conclusion of hostilities declined to become President and resigned his powers to General Monagas. Scarcely a year later, however, he rebelled against the despotism of his successor, was defeated and captured, and was kept in prison until 1850, when he was allowed to leave the country. After the fall of Monagas, in 1858, Paez returned to Venezuela and in 1860 was appointed Minister to the United States. The next year he was made commander of the army, and a few months later was proclaimed Dictator. On account of age he confided his duties to one of his ministers, who grossly usurped his power. The result was an insurrection which spread rapidly until, on June 15, 1863, Paez was forced to resign his office and again go into exile. In 1871 he went to New York, where he passed the last years of his life. In 1888 his remains were placed in the Pantheon at Carácas. Consult: R. Paez, *Public Life of J. A. Paez* (New York, 1864); *Autobiografía de General José Antonio Paez* (ib., 1867); Guzmán Blanco, *Apoteosis de General Paez* (Paris, 1889); T. C. Dawson, *The South American Republics* (New York. 1904); J. Gil Fortoul, *Historia constitucional de Venezuela* (Berlin, 1907).

PAGAN, pȧ-gän′. A town and pilgrim resort of the Myingyan District, Upper Burma, India, on the left bank of the Irrawaddy River, 92 miles southwest of Mandalay (Map: Burma, C 2). Pagan was the capital of Burma from its foundation in 847 A.D. until 1284, when, to resist the advance of an avenging Chinese army, the Burmese ruler demolished a great part of the city to build fortifications, but finally abandoned the project and fled. The ruins of Buddhist temples and pagodas in every stage of dilapidation occupy an area along the river about 8 miles long by 2 miles broad. The best preserved and most important archæologically of the temples are the eleventh-century cruciform Ananda temple, occupying a square of 280 feet and rising to a height of 183 feet; the Thapinyu, 201 feet high, built in 1100; the Gaudapalin, 180 feet high, built in 1160; and the low quadrangular Bodhi, dating from 1200. There is a museum with interesting relics.

PA′GAN. See Polytheism.

PAGANI, pȧ-gä'nē. A town in the Province of Salerno, Italy, on the Naples-Taranto Railroad, 21 miles southeast of Naples. In the church of San Michele is the tomb of Alfonso de Liguori, founder of the Order of the Redemptorists. There are manufactures of silk and cotton goods and matches. Pop. (commune), 1901, 14,607; 1911, 14,931.

PAGANINI, pä'gȧ-nē'nē, Niccolò (1782–1840). A famous violinist, born in Genoa, Oct. 27, 1782, the son of a poor shopkeeper. He studied at first under Servetto, the leader of the Genoa Theatre, and two years later under Costa, the principal violinist and conductor in the cathedral at Genoa, with whom he made his greatest progress. Other teachers were Gnecco, Alessandro Rolla, and Ghiretti. He produced his first sonata before he was nine years of age, and was also desired by his teacher to perform every Sunday in church a violin concerto, a practice to which Paganini attached great importance, in that it forced him to the constant study of new music. His first appearance in public was in 1793 at Genoa. In 1796 he went to Parma, where for a short time he was a pupil of Rolla. About this time he evolved a style of fingering and a method of bowing peculiar to himself. So far he had been wholly under the control of his father, whose only thought apparently was as to how far he could turn his son's talent to his own financial advantage; but in 1798, after a very successful concert at Lucca, he threw off parental control and made a tour of Pisa and other places. He was everywhere received with the utmost enthusiasm and, although but a youth, he unfortunately became intoxicated with the license of his life and plunged into all kinds of dissipation, especially that of gambling. Alternate periods of gambling and study, both pursued with equal zeal, reacted dangerously on his naturally weak constitution, with the result that illness frequently prevented his fulfilling engagements. On one occasion he was announced for a concert at Leghorn, but having gambled away his money and pawned his violin, he was compelled to appeal for the loan of an instrument to keep his engagement. In this emergency M. Levron, a French merchant of Leghorn, lent him his Guarnerius, said to be one of the finest violins in the world. After the concert, when Paganini desired to return the instrument, its owner exclaimed, "Never will I profane the strings which your fingers have touched. That instrument is yours." Paganini used this instrument at all his concerts and at his death bequeathed it to his native town of Genoa, where it is still preserved in the museum. Some time later the painter Pasini presented him with a magnificent Stradivari, but this Guarnerius always remained Paganini's favorite instrument. From 1801 to 1803 he lived in comparative retirement at his home, dividing his attention between composition and the guitar, on which instrument he was very proficient. He took up his concert tours in 1805, meeting, if possible, with greater enthusiasm than before. He was appointed court solo violinist at Lucca, at which place he remained until 1808, and then for 20 years made concert tours in Italy. In 1828 he began his tours of other countries, commencing with Austria. His opening concert in Vienna was a complete triumph. The gold medal of St. Salvator was conferred upon him by the city authorities; from the Emperor he received the title of court virtuoso, and on all sides he was hailed as the popular hero. A similar success greeted him in Germany (1829) and in France (1831). His first appearance in London was on June 3, 1831, and in the year which followed he appeared in the principal cities of England, accumulating a considerable fortune. He then returned to Paris, but revisited England the following season. The winter of 1833–34 was spent in Paris, during which period he maintained a close intimacy with Berlioz. In 1834 he returned to Parma and purchased several properties, in one of which, the Villa Bagona, he made his residence for two years. About this time his health gave signs of a complete breakdown. The end of his career was rapidly approaching. He journeyed to Marseilles, from there to Genoa, and shortly afterward to Nice, in which city he died May 27, 1840. His technic in double-stops, left-hand pizzicato, harmonics, and staccato approached the miraculous, while his power and control of tone and the intense passion of his style brought his audiences into instant subjection, so that he swayed them at will. He had many personal eccentricities and numberless tricks of virtuosity. His compositions include 24 capricci for single violin; 6 sonatas for violin and guitar; 3 grand quartets for violin, viola, guitar, and violoncello (op. 4, 5); concerto in E♭ (solo part written in D, for a violin tuned a semitone higher; op. 6); and a concerto in B minor. Consult: S. S. Stratton, *Nicoolo Paganini: His Life and Work* (New York, 1907); J. G. Prod'homme, *Paganini* (Paris, 1907; Eng. trans. by A. Matullatto, London, 1911); J. Kapp, *Paganini: eine Biographie* (Berlin, 1913). See Plate of Violins.

PAGE, Carroll Smalley (1843–). An American legislator, born at Westfield, Vt. He engaged in banking, manufacturing, and railroad enterprises and served as a Republican in the Vermont House of Representatives in 1869–72 and in the State Senate in 1874–76. He was register of probate in 1880–91 and savings bank examiner in 1884–88, served as Governor of Vermont in 1890–92, and being elected United States Senator for the unexpired term (1908–11) of Redfield Proctor, was reëlected for the term 1911–17.

PAGE, Curtis Hidden (1870–). An American professor and editor, born at Greenwood, Mo., and educated at Harvard (A.B., 1890; A.M., 1891; Ph.D., 1894) and at Paris and Florence. After holding various teaching positions in French and English at Western Reserve University, at Harvard, and at Columbia, where he was professor of the Romance languages and literatures (1908–09), he served as professor of English in Northwestern University (1909–11) and then at Dartmouth. In 1905 he was associate editor of *Poet Lore*, in 1906 of the *Pathfinder*. Translations from his pen are: *A Voyage to the Moon* (1899), by Cyrano de Bergerac; *Songs and Sonnets of Ronsard* (1903); *The Best Plays of Molière* (2 vols., 1907); *The Man who Married a Dumb Wife*, by Anatole France (1915). He is responsible editorially for *British Poets of the Nineteenth Century* (1904); *Rabelais* (1905); *The Chief American Poets* (1905); *Golden Treasury of American Songs and Lyrics* (1914).

PAGE, David Perkins (1810–48). An American educator, born at Epping, N. H. He was educated at the Hampton Academy and was afterward principal of a department in Newburyport High School. In 1845 he was appointed first principal of the Albany State Normal School, a post he held until his death. His work, *Theory and Practice of Teaching, or the Motives of Good School Keeping* (1847), remains a valuable work on the subject. The edition of 1886 contains a biography by W. H. Payne.

PAGE, John (1744–1808). An American patriot, born at Rosewell, Va. He graduated at William and Mary College in 1763, sat in the Virginia House of Burgesses, and became a member of the Colonial Council. He was a member of the convention which in 1776 framed the constitution of Virginia, at one time was colonel of a militia regiment, was appointed one of the first councilors, was a member of the Committee of Public Safety, and was Lieutenant Governor of the State. In the course of the war he contributed a large part of his very considerable private fortune to aid the Patriot party. He was a member of Congress from 1789 to 1797, and in 1802–05 he was Governor of Virginia. Subsequently, until his death, he was commissioner of loans for this State. He wrote *Addresses to the People* (1796, 1799).

PAGE, Thomas Jefferson (1808–99). An American naval officer, born in Gloucester Co., Va. He was appointed a midshipman in 1827, became lieutenant in 1839, and commanded the *Dolphin* against the Chinese pirates. From 1853 to 1860 he was engaged in making surveys of South American rivers. In 1855 he had reached the rank of commodore, but upon the secession of Virginia resigned from the United States service. He declined the rank of admiral in the Italian navy, and commanded the Confederate batteries at Gloucester Point, York River, Va. He was made commodore in 1862 and was sent to England to superintend the building of two powerful rams on the Mersey, but these were seized by the British government on the protest of Charles Francis Adams, the United States Minister. In January, 1865, a small ironclad, built for the Confederacy, was commissioned at Copenhagen and called the *Stonewall*. In this he cruised for some time after the collapse of the Confederacy, but turned her over to the Governor-General of Cuba in return for $16,000 to pay the crew. Afterward he engaged in cattle and sheep raising in the Argentine Republic and superintended the building of four gunboats for the navy of that country. The last 20 years of his life were spent in Florence, Italy. He published *La Plata: The Argentine Confederation and Paraguay* (1859).

PAGE, Thomas Nelson (1853–). An American novelist. Of old Virginian stock, he was born April 23, 1853, on Oakland Plantation, Hanover Co., Va. He was educated at Washington and Lee University and in law at the University of Virginia (LL.B., 1874). Until 1893 he practiced in Richmond, Va., then moved to Washington, D. C., where he resided thereafter. He was honored with degrees from several universities and with membership in the American Academy of Arts and Letters. In 1913, by appointment of President Wilson, he became Ambassador to Italy. Aside from some dialect poetry, his first noteworthy literary venture was the tale *Marse Chan*, published in 1884 and incorporated, with *Meh Lady* and other stories, in the volume entitled *In Ole Virginia* (1887). Other books by him are: *Two Little Confederates* (1888); *Befo' de War* (1888), a collection of his early poems together with poems by A. C. Gordon; *On Newfound River* (1891); *Elsket and Other Stories* (1891); *The Old South* (1892), a volume of essays; *Pastime Stories* (1894); *The Burial of the Guns* (1894); *The Old Gentleman of the Black Stock* (1897); *Two Prisoners* (1898); *Red Rock* (1898); *Gordon Keith* (1903); *Bred in the Bone* (1904); *The Negro: The Southerner's Problem* (1904); *The Old Dominion: Her Making and her Manners* (1908); *Robert E. Lee, the Southerner* (1908); *John Marvel, Assistant* (1909); *Robert E. Lee, Man and Soldier* (1911); *The Land of the Spirit* (1913); *The Stranger's Pew* (1914). A collective edition of his works was published in 1906 (12 vols., New York). Mr. Page's novels and stories, with few exceptions, deal with Virginia and are noted for their sympathetic portrayal of the courtly and high-spirited aristocracy of that State just before, during, and after the Civil War, and also for their studies of the negro in slavery days and after.

PAGE, Walter Hines (1855–). An American editor and diplomat, born at Cary, N. C. He graduated from Randolph-Macon College in 1876 and was a fellow in Greek at Johns Hopkins University from 1876 to 1878. Afterward, while engaged in teaching at Louisville, Ky., he submitted an article to the *Atlantic Monthly*, and when it was accepted he decided on a literary career. In 1880 he became editor of the St. Joseph, Mo., *Daily Gazette*, and was later connected with the New York *World* as book reviewer. On the change of management of that paper he returned South and became the editor and one of the founders of the Raleigh (N. C.) *State Chronicle*, which was soon known over the country for its editorials and exploitation of Southern resources. After this paper became well established Page returned North and purchased a part interest in the *Forum*, of which he was editor from 1890 to 1895. Thereafter until 1899 he was literary adviser of Houghton, Mifflin & Co., from 1896 to 1899 also editor of the *Atlantic Monthly*. In 1899 he helped to found the publishing house of Doubleday, Page & Co., from 1900 to 1913 editing its magazine, the *World's Work*. In 1913 he accepted from President Wilson the post of Ambassador to Great Britain. Some temporary opposition to him later developed on account of certain passages in his book *The Rebuilding of Old Commonwealths* (1902). Various important notes to the British government respecting the rights of the United States as a neutral nation passed through the hands of Ambassador Page during the European War. In 1914 he received the degree of D.C.L. from Oxford.

PAGE, William (1811–85). An American portrait and historical painter. He was born at Albany, N. Y., and studied with S. F. B. Morse, and at the Academy of Design, New York. He took up portrait painting at Albany and later at New York, where, in 1836, he was elected to the National Academy. His works of this period include the forceful portrait of Governor Marcy for the New York City Hall, that of John Quincy Adams for Faneuil Hall, Boston, and "The Holy Family," Boston Athenæum. In 1849 he went abroad, residing at Rome and Florence, where he made many fine copies of Titian and painted his celebrated "Venus," the "Flight into Egypt," the "Infant Bacchus," besides portraits of Robert and Elizabeth Browning and others. In 1860 he returned to New

York and in 1871–73 was president of the Academy. Among his other works are "Ruth and Naomi" (New York Historical Society), "Farragut at the Battle of Mobile" (1871, owned by the Emperor of Russia), and the portrait of General Grant. His work is exceedingly varied and unequal, and though experimental and imperfect, some is remarkably fine in color and draftsmanship. He published a *New Geometrical Method of Measuring the Human Figure* (New York, 1860).

PAGEANTS (păj′ents) and **CELEBRATIONS.** The commemorating of some historic event by a celebration in which historic reproductions of the event or period are shown is growing in frequency in the United States. Important historic events in the history of the nation, as the centennial of the Declaration of Independence (1876), the four hundredth anniversary of the discovery of America (1892), the Louisiana Purchase (1904), and the completion of the Panama Canal (1915), have been celebrated by great expositions (see EXHIBITIONS), but the enormous cost of these as well as their doubtful financial success has led in recent years, especially when the event was perhaps more local, to the use of either a pageant or celebration as a means of commemorating it. The modern pageant, which is usually a dramatic representation of several scenes or episodes, either tableaux or miniature integral dramas connected by a prologue, generally given out of doors, came to the United States by way of England.

Pageants are not new, for they may be traced back to the early miracle and morality plays that were once common and later to such festivities as that given at Kenilworth Castle in honor of Queen Elizabeth, which has been described as a model of its kind. In 1905 the first of the modern historical pageants was given in Sherborne, Dorset. It was successful and at once became popular for celebrating anniversaries of historic towns in England. Some of the more notable of these recent pageants are the following: Bath (1909), Coventry (1907), English Church, London (1909), Liverpool (1909), Oxford (1907), St. Albans (1907), Warwick (1906), Winchester (1908), and York (1909). Such celebrations extend over several days (seldom more than a week), so that the representations of the pageants have been limited to a very few performances. The participants are usually persons locally interested, and from the surplus obtained by sale of tickets, after the expenses have been paid, funds have been secured for the restoration of historic buildings or for charitable purposes.

Nor is it in England alone that the pageant has developed, for progress has been equally conspicuous in the United States. Of a historic character the following are typical: In 1863 in St. Louis there was given for the benefit of sick and wounded soldiers a series of historic tableaux by "40 young ladies and several gentlemen," entitled "America as it Was and America as it Is"; while in 1889 there was given in New York City a "National Pageant and Dramatic Events in the History of New York." The celebration of Mardi Gras in New Orleans and elsewhere in the Southern States, that of the Veiled Prophet in St. Louis and other harvest festivals, as well as the Flower Festivals in southern California, including the periodical presentation of La Portola in San Francisco, have had their influence upon the development of the pageant. Mention might also be made of such spectacular outdoor shows as the Fall of Babylon (1887) and the Fall of Rome (1888), given at St. George, Staten Island, N. Y., and elsewhere by Kiralfy.

College plays, such as the famous production of *Œdipus Tyrannus* of Sophocles given under the direction of George Riddle at Harvard in 1881, have developed until such splendid results have been obtained as the presentation under the auspices of the University of California of a "Masque of Maidenhood" (1912) or the "Pageant of the Prairies" (1914), given by the students of the University of North Dakota. A recent combination of the historic and the college presentation was given in 1912 in celebration of the two hundred and fiftieth anniversary of the founding of Schenectady. It was given on Union College grounds and included the following episodes: Traditional Life, Early Settlement, Patriotic Schenectady, Development of the Town, and Modern Schenectady. In California there have been given under the auspices of the Bohemian Club of San Francisco, annually, so-called "grove plays," of which the "Hamadryads" (1904), "The Triumph of Bohemia" (1907), and "Sons of Baldur" (1908) are typical. These have been among the elements that have contributed to the development of the modern pageant in the United States.

Among the formal pageants held in the United States that are especially worthy of record are the following:

Marietta, Ohio, in 1888, celebrated the centennial of the organization of the Northwest Territory.

Cornish, N. H., in 1905, celebrated the twentieth anniversary of the founding of the Cornish colony by A. St. Gaudens. The masque was written by Louis Evan and the prologue by Percy MacKaye.

Philadelphia, Pa., in 1908, celebrated the two hundred and twenty-fifth anniversary of the founding of the city by a series of 7 incidents, illustrated with 68 scenes and arranged by E. P. Oberholtzer.

Gloucester, Mass., in 1909, presented an outdoor dramatic pageant, or masque, depicting scenes from Percy MacKaye's *Canterbury Pilgrims.* The pageant was given by the Coburn Shakespearean Players, with music by Walter Damrosch. This pageant had for its purpose the raising of funds to reproduce Stage Fort, an ancient landmark of 1623, which will be used as a permanent historic museum.

Lake Champlain, N. Y., in 1909, celebrated the tercentenary of the discovery of the lake by a spectacle entitled "Hiawatha, the Mohawk," depicting the siege of Hochelaga and the battle of Lake Champlain. It was given at several places along the lake by a band of Iroquois Indians on a floating stage.

Hadley, Mass., in 1909, celebrated the two hundred and fiftieth anniversary of the founding of the town with a pageant arranged by Clarence Hawks.

Chicago, Ill., in 1909, gave a pageant of the Italian Renaissance, arranged by Thomas W. Stevens.

Philadelphia, Pa., in 1912, celebrated the one hundred and twenty-fifth anniversary of the framing of the Constitution of the United States by an outdoor pageant of 10 episodes with 16 scenes, with words by F. H. Williams. Five thousand costumed persons participated.

New York City in 1914 gave a "Pageant of the Melting Pot" in which Irish, Bohemians, Croatians, Poles, Ruthenians, Jews, and Italians of New York exhibited their native songs, dances, and costumes.

St. Louis, Mo., in 1914, celebrated its early history, beginning with the older Indian civilization and ending with the close of the Civil War. The St. Louis pageant and masque, which was the greatest thus far held in the United States, announced as its purpose an effort "to arouse a city of 800,000 people to a sense of its solidarity and to a sense of the possibility of infinite achievement by a community under the spell of a unifying idealism." The words of the masque were written by Percy MacKaye and the music was by F. S. Converse, while the pageant was written and staged by Thomas W. Stevens. Seats were provided for 45,000 persons, half of whom were admitted free, a condition demanded by the city authorities for permitting the sale of seats in Forest Park, a public pleasure ground. There were 7500 performers, and four presentations were given in the evening, beginning at 6.30 o'clock and lasting until 11. The spectators numbered 50,000 on the first night, and as the interest grew this number was increased threefold. A guarantee fund of $60,000 was raised and the expenses were estimated to have been $125,000.

Bourne, Mass., in 1914, celebrated, under the direction of William C. Langdon, with 1000 performers and music by D. G. Mason, the completion of the Cape Cod Canal. The pageant consisted of 10 historical scenes and 5 interludes.

New York City in 1914 celebrated the tercentenary of the founding of Manhattan by the presentation in Central Park of a historic pageant of 300 years of commercial, industrial, and educational progress. The pageant was written by W. J. Lee and was participated in by 10,000 children.

Quebec, Canada, in 1908, celebrated the three hundredth anniversary of its founding by the portrayal in realistic scenes on the Plains of Abraham, of the great deeds of French and English pioneers.

In addition to the foregoing there has been held in recent years a number of historical celebrations in which the dramatic element has not appeared and yet in which the spectacular effect has been obtained but in such a way as to interest and impress the public without cost to them. A brief mention of the three most important is given.

The Hudson-Fulton celebration, commemorating the discovery of the Hudson River by Henry Hudson in 1609 and also the inauguration of steam navigation by the trip of the *Clermont* from New York to Albany under Robert Fulton in 1809, was held in New York City from Sept. 25 to Oct. 2 and at various places along the Hudson from Oct. 3 to 10, 1909. The programme was long and included many events. It began with a naval rendezvous and parade participated in by vessels of the United States and foreign nations on September 25, followed by patriotic religious services in the various churches on Sunday. On September 27 the Interstates Palisades Park and the Hudson Monument were dedicated, while the official reception and music festivals were held in the evening. On September 28 a historic pageant or parade was given in which more than 50 floats showing scenes of historic interest passed in review. The general commemorative exercises, mostly of an educational character, were held in various schools, and in the evening at 70 centres illustrated lectures were given. Also on this day various tablets and other memorials were dedicated, and in the evening the official banquet was given. On September 30 the military parade was held, participated in by Federal troops, the National Guard, and the marines of the United States and visiting navies. On October 1 the naval parade escorting a reproduction of the *Clermont* proceeded up the Hudson to Newburgh, where it was met by the upper Hudson division. The last day, October 2, was devoted to children's festivals in all the public parks and grounds in New York City, while in the evening a carnival parade was held in which there passed in review 50 floats showing legendary and other scenes assembled under the auspices of the German, Austrian, and Swiss societies of New York. During the week that followed local exercises were held in the larger places along the Hudson River, culminating with more spectacular events that were given in Albany on October 8 and 9. Special exhibitions were arranged for the benefit of the public by all of the historical and educational institutions and museums in New York City, to which free admission was given. Also at the various colleges, both in New York City and at Cornell and Hobart, exercises were held in commemoration of the celebration.

The Lake Erie celebration, which commemorated Commodore O. H. Perry's victory at Put-in-Bay and also the 100 years of peace with Great Britain, was progressively celebrated. It began on July 4 with a celebration at Erie, Pa., continuing at other lake ports, including Toledo, Detroit, Milwaukee, Chicago, Buffalo, and Sandusky, and culminating at Put-in-Bay and Cleveland on Sept. 5–10, 1913. The local celebrations were essentially similar and included parades of military and of floats emblematic of historic events, addresses and literary exercises, and fireworks. Two features at Erie were of interest. They were the reception of the identical powder wagon that 100 years previously had made the journey from Wilmington, Del., across the Alleghanies to Erie, and the inspection of the flagship *Niagara*, which was raised from the bottom of Lake Erie and restored for the occasion. This vessel, convoyed by a fleet of representative naval and lake vessels, was a feature of the celebrations at the various lake ports. The great day was September 10, when the Perry memorial was dedicated with appropriate exercises by Gov. James M. Cox, of Ohio. This memorial, located on Put-in-Bay Island, consists of a Doric column 300 feet high, flanked on either side by memorial buildings. The reinterment in the crypt of the memorial of the bodies of those who died in the battle was one of the features of the celebration, which terminated with a great banquet participated in by representatives of the United States and the British Empire.

The national Star-Spangled Banner celebration, commemorating the centenary of the battle of North Point and the writing of Francis Scott Key's immortal poem, was held in Baltimore, Md., from Sept. 6 to 13, 1914. The features of the celebration included an industrial parade with 500 floats on September 7; a carnival night on September 8; a parade of fraternal orders with 60.000 men in line and 60 allegorical floats on September 9; on September 10 an electrical historical pageant with decorated floats illustrative of incidents and events of the War of 1812, and historical happenings leading to the dawn of the morning when Francis Scott Key wrote "The Star-Spangled Banner"; a military parade in the morning and a military ball on the evening of September 11; and various patriotic exercises, including the unveiling of a monument at Fort McHenry to Major William Armistead its defender, on September 12. Consult: E. H. Hall, *Hudson-Fulton Celebration, 1909* (2 vols., Albany, 1911); M. L. Spencer, *Corpus Christi Pageants in England: A Study of Mediæval Cycle Plays* (New York, 1911); E. W. Bates, *Pageants and Pageantry* (Boston, 1912), containing a bibliography; Percival Chubb, *Festivals and Plays in Schools and Elsewhere* (New York, 1912); Ralph Davol, *Handbook of American Pageantry* (Taunton, Mass., 1914).

PAGEL, pä′gel, Julius Leopold (1851–1912). A German physician and medicohistorical writer, born in Pollnow, Pomerania. He graduated M.D. (1875) at the University of Berlin, where he joined the medical faculty (1876) and became assistant professor of the history of medicine (1902). He also practiced in Berlin. Pagel was assistant editor of Hirsch's *Biographisches Lexikon* and editor of the *Biographisches Lexikon hervorragender Aerzte des neunzehnten Jahrhunderts* (1901). Among his works are: *Die Anatomie des H. von Mondeville* (1889); *Einführung in die Geschichte der Medizin* (1899; 2d ed., by Karl Sudhoff, 1915); *Zeittafeln zur Geschichte der Medizin* (1908).

PAGÈS. See Garnier-Pagès.

PAGET, păj′ĭt, Francis (1851–1911). An English bishop, son of Sir James Paget. He was educated at Christ Church, Oxford, to which, after holding several pastoral charges, he returned in 1885 to be regius professor of pastoral theology and canon. In 1892 he became dean of Christ Church and in 1901 succeeded Dr. Stubbs as Bishop of Oxford. During his incumbency he incurred the hostility of extreme ritualists. His publications include *Redemption of War* (1900) and *Christ the Way* (1902).

PAGET, păj′ĭt, Francis (1851–1911). An English physician and reformer of medical education, born at Great Yarmouth, Norfolk. He studied at Charterhouse School and at Gonville and Caius College, Cambridge, and got his medical education at St. Bartholomew's Hospital and in Paris. He practiced in Cambridge, and in 1842 his suggestion of bedside examinations for medical students was adopted by the university. Paget represented Cambridge in the General Council of Medical Education (1863 et seq.) and served as its president (1869, 1874). For the last score of years of his life he was regius professor of physic in Cambridge. Paget wrote little besides papers for the *Lancet*, the *British Medical Journal*, and the *Edinburgh Medical Journal.*

PAGET, Henry William, first Marquis of Anglesey. See Anglesey.

PAGET, Sir James (1814–99). An English surgeon and pathologist, born at Yarmouth. He became apprenticed there to Charles Costerton, a practitioner, from whom he gained the rudiments of medical knowledge. Having finished his apprenticeship, Paget in 1834 entered St. Bartholomew's Hospital, London, where he distinguished himself in his first year by discovering the *Trichina spiralis*. He was soon made curator of St. Bartholomew's Hospital Museum and in 1839 demonstrator in the hospital. In 1842 Paget undertook an immense task which resulted in the publication of the *Descriptive Catalogue of the Pathological Specimens Contained in the Museum of the Royal College of Surgeons* (1846–49). For St. Bartholomew's Hospital Museum he prepared a similar catalogue. While professor of anatomy at the College of Surgeons (1847–52) he delivered a famous series of lectures on surgical pathology. He became surgeon to Queen Victoria and the Prince of Wales and to St. Bartholomew's Hospital (1861). In 1871 he was created Baronet. Paget became president of the Royal College of Surgeons in 1875. His chief works, besides the *Descriptive Catalogue*, were his *Lectures on Tumors* (1851); *Lectures on Surgical Pathology* (1853; 4th ed., 1876), for many years the standard textbook in England and the United States; *Clinical Lectures and Essays* (1875; Fr. trans.); *Studies of Old Case-Books* (1891). In pathology he became known through his studies of eczema of the female breast and of osteitis deformans. See Paget's Disease.

PAGET, Violet, pen name Vernon Lee (1856–). An English author who in 1871 settled in Italy. Among her publications are: *Studies of the Eighteenth Century in Italy* (1880); *Belcaro* (1881), a volume of essays; *The Prince of the Hundred Soups* (1883), a fairy tale; *Ottilie: An Eighteenth Century Idyll* (1883); *Euphorion* (1884), a collection of essays; *Miss Brown* (1884), a novel; *Baldwin* (1886), philosophical dialogues; *A Puppet Show* (1889); *Hauntings* (1890); *Vanitas* (1892); *Althea* (1893); *Renaissance Fancies* (1895); *Limbo* (1897), a volume of essays; *Genius Loci* (1899); *Hortus Vitæ* (1903); *In Umbria* (1903); *Sister Benvenuta* (1906); *The Sentimental Traveler* (1907); *Gospels of Anarchy* (1908); *Laurus Nobilis* (1909); *Vital Lies* (2 vols., 1912); *The Tower of Mirrors* (1913); *The Beautiful: An Introduction to . . . Æsthetics* (1914).

PAGET'S DISEASE. An affection of the female breast beginning upon the nipple, spreading to the areola, and later involving the entire gland, which becomes cancerous. It starts upon the summit of one nipple, usually the right, and is characterized by the formation of firm, adherent crusts which, when removed, reveal a reddened or ulcerated and fissured surface underneath. The ulceration and crusting gradually spread, giving rise to itching and burning sensations. The nipple becomes retracted and sometimes even disappears. Sooner or later cancerous nodules appear in the breast and the characteristic symptoms of mammary cancer are established. It is now believed that the process is malignant from its inception. The treatment consists of early and thorough removal of the breast.

Paget's disease is also an eponymic term for osteitis deformans, a rare disease of the bones of the head, spine, and lower extremities. Sir James Paget described this in 1877. The chief characteristic of the disease is enlargement, followed by softening, of the bones, with subsequent deformity. The legs, unable to bear the weight of the body, become twisted and misshapen and the spinal column is shortened and bent. The cause is not known, but, like acromegaly and osteomalacia (qq.v.), it may be due to disturbed function of the glands of internal secretion. It is not syphilitic in origin. See Paget, Sir James.

PAGLIACCI, pä-lyä'chē. An opera by Leoncavallo (q.v.), first produced in Milan, May 21, 1892; in the United States in 1893 (New York).

PAGO'DA (Sp. *pagoda*, from Pers. *butkadah*, idol temple, pagoda, from *but*, idol + *kadah*, temple; Chin. *peh-kuh-t'a*, *poh-kuh-t'a*, white bone tower, *pao-t'a*, precious tower, *t'a*, tower, pile). In the architecture of eastern Asia, any tower-like structure connected with a temple or serving as a shrine. Both the etymology and the precise meaning of the word are somewhat uncertain.

In the magnificent Hindu temples of India the pagoda is generally a pyramidal structure raised above a gateway or above the inner sanctuary, but the word may also designate an independent shrine, similar to that of Buddha's tooth at Bodh Gaya. (See Indian Art; also Dravidian Architecture.) These Indian pagodas are among the most splendid buildings of pure monumental design in the world. The term is also incorrectly applied to the tope (q.v.) or stupa.

In China a pagoda is often a memorial building and not connected with a temple or a monastery. The most common form is an octagonal tower of many stories, with curved roof and curved eaveslike veranda roofs at each story. Most Chinese pagodas are built of brick, with no very great architectural pretension, but they are effective in outline, and their great number in certain parts of the Empire adds a peculiar charm to the landscape. Little archæological and critical study has been given to them (see Chinese Art), but the books and photographs of travelers show them to be very numerous. In Japan the pagoda is a common adjunct to the *hondo*, or temple proper, and is usually built of wood, on account of earthquake perils. The most celebrated is that of Horiuji (seventh century); others at Nara, Kyoto, Nikko, etc., reproduce the type. They are extraordinary masterpieces of timber framing, designed with consummate art. See Japanese Art.

PAGOPAGO, pä'ngō-pä'ngō. One of the great natural harbors of the world, on the south coast of Tutuila (q.v.), and the seat of the administration of American Samoa (Map: Guam, D 3). From the visit of Commodore Wilkes in 1839 the chief of Pagopago recognized the right of the United States to use this bay for naval refitting; in 1872 Commander R. W. Meade made an unauthorized treaty establishing this right, but the Senate allowed it to lapse; in 1878 the confirmation of the Evarts-Mamea Treaty gave this matter official standing; in 1889 the Berlin General Act recognized the right of the United States to Tutuila as exclusive. In 1900 the Samoan Kingdom was partitioned and the United States assumed sovereignty east of long. 171 W. Since that time a station ship has been kept at Pagopago.

PAGRATIDES. See Bagratides.

PAHANG, pȧ-häng'. The largest of the Federated Malay States, situated on the eastern coast of the Malay Peninsula and bounded by the states of Kelantan and Trengganu on the north, the China Sea on the east, the states of the Negri Sembilan and Johore on the south, and the states of Perak and Selangor on the west (Map: Burma, D 6). Its area is officially estimated at 14,000 square miles. It is a thickly wooded and partly mountainous region traversed by the Pahang River, which is formed by the confluence of the Jelai and the Tembeling. The Pahang, probably the largest in the peninsula, has a length of about 285 miles, of which 232 miles are navigable for small craft. The coast is mostly sandy and indented at the mouths of the rivers, which, on account of bars, are accessible only during high tide. The climate is cooler than on the western coast and the soil well adapted for agriculture. The state has been noted for its gold deposits and some gold is still produced; but, after agriculture, the principal industry is tin mining, especially in the Raub and Kuantan districts. The Malays are chiefly engaged in agriculture, while for mining Chinese are mostly employed. Imports and exports were valued in 1900 at 917,405 and 2,322,950 Straits Settlements dollars, respectively; in 1905, 1,344,346 and 3,838,928; in 1910, 2,140,973 and 4,048,025; in 1913, 3,268,983 and 7,006,474. A railway from Gemas in the Negri Sembilan to Kuala Semantan, about 70 miles, was completed in 1911; its extension northward to Kelantan has been undertaken. The financial condition of the state is unsatisfactory, but the revenue is gradually increasing. While Pahang is the largest of the Federated Malay States in area, it is the least populated. The census of 1901 gives the population as 84,113, including 134 whites, 73,462 Malays and other natives (including 1397 aborigines), 8695 Chinese, and 1227 Tamils and other natives of India. The 1911 census returned a population of 118,708; estimate at end of 1913, 126,490. A British Resident was first appointed to the Sultan of Pahang in 1888. The Federation was formed in 1895, with Pahang as one of the constituent states. The seat of administration is Kuala Lipis, 209 miles by river from the mouth of the Pahang and 83 miles by road from Kuala Kubu, on the railway in Selangor. The Sultan continues to reside at the old capital, Pekan, near the mouth of the Pahang. See Federated Malay States.

PAHARIA, pȧ-hä'rē-ȧ. An alternative name for the Maler, of the Rajmahal Hills in Bengal, one of the northern Dravidian peoples. Farther south in the same region dwell the Mal-Paharias, whose affinities are not very clear. One of the sections of the population of Nepal, speaking a neo-Aryan dialect, is also called Paharia. Some account of the Dravidian Paharia will be found in Dalton, *Descriptive Ethnology of Bengal* (Calcutta, 1872), and the works of a general character relating to the Dravidian peoples. See Dravidians.

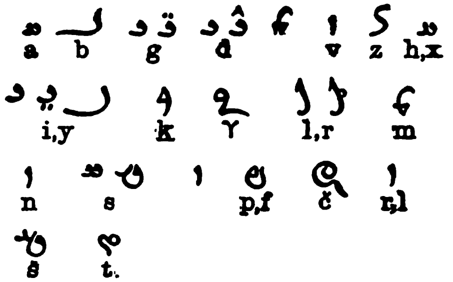
PAHLANPUR, pä'lan-po͞or'. A native state of India. See Palanpur.

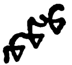
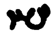
PAHLAVI (pä'lȧ-vē) **LANGUAGE AND LITERATURE** (from Pers. *Pahlav*, hero, name of a district about Ispahan, from OPers. *Parθava*, Parthia; cf. Skt. *Pahlava*, Persian). The language and literature of the middle Persian period, extending from the third to the ninth or tenth century A.D.; yet the origin of Pahlavi, as the name denotes, may be traced back with probability, through coins and incidental allusions, to preceding Parthian times. The language is closely akin to Old Persian (q.v.) and Modern Persian (see Persian Language) in direct line of descent, although it stands far nearer to the latter than to the former. In its phonology Pahlavi in the main agrees with modern Persian. The principal divergences are as follows: original initial *a*, lost in Persian, is still found in Pahlavi, as Pahl. *anumīd*, Pers. *numīd*, hopeless, Pahl. *anāk*, Pers. *nāk*, evil; the diphthongs *ē* and *ō* (Indo-Iran. *ai*, *au*, Skt. *ē*, *ō*, Av. *aē*, *ao*) are retained unchanged in Pahlavi, except that in the later period before *m* and *n* they become *ī*, *ū*, while in Persian they are changed to *ī* and *ū* throughout, as Av. *daēva*, Pahl. *dēv* (cf. the Armenian loan word *dev*), demon; Av. *raočah*, Pahl. *rōz* (cf. the Armenian loan word *ročik*, daily bread), Pers. *rūz*, day; but Av. *daēna*, Pahl. *dēn* (cf. the Armenian loan word *den*), *dīn*, Pers. *dīn*, creed; Av. *haoma*, Pahl., Pers. *hūm*, sacred plant; original intervocalic *k* and *p* are retained in Pahlavi, but become *g*, and *b* or *v* in Persian, as OPers. *bādaka*, slave, Pahl. *bandakān*, Pers. *bandagān*, slaves; OPers. *api*, Pahl. *āp*, Pers. *āb*, water; OPers. *niyapišam*, I wrote, Pahl. *nipištan*, Pers. *nivištan*, to write; initial *v* remains unchanged in Pahlavi, but in Persian becomes *b* or *g*, as OPers. *vasiy*, Pahl. *vas*, Pers. *bas*, much; Av. *vazra*, Pahl. *vazr*, Pers. *gurz*, club; Iranian *s* is retained in Pahlavi, but becomes *h* in Persian, as Av. *kasu*, Pahl. *kas*, Pers. *kah*, small.

Like modern Persian Pahlavi has lost all the nominal inflections excepting the plural ending, as *rūbān*, soul, plural *rūbānān*, and the *ī* or *izāfat* which serves to express the genitival and adjectival relations, as *garmīk-i ātaš*, heat of the fire; *zan-ī pagōhar*, nobly born wife. The other case relations are expressed by prepositions, as *ō ōy gūft*, he said to him; *mahīšt pa tanō*, greatest in body; *fratūm men marṭān*, first of men. Plural adjectives in Pahlavi receive no termination unless they are employed as substantives, and then, as a rule, only if there is no accompanying word to show the plural, as *darvandān*, wicked (men), but *hamāk ān ī buland kōf*, all the high mountains, while the attributive adjective is invariable, as *nīūk būdand*, they are good. The comparative and superlative degrees are formed by *-tar*, and *-tūm* or *-īšt* respectively, as *hūp*, good, *hūptar*, better; *tag*, brave, *tagatūm*, bravest; *kam*, few, *kamīšt*, least. The pronouns and numerals do not differ essentially from those found in modern Persian. The conjugation is very simple. The active voice alone remains, the passive being periphrastic in its formation. The moods are indicative, imperative, subjunctive (corresponding to the modern Persian precative), and potential (corresponding to the Old Iranian optative), besides a present, a past, and a future participle, and an active infinitive. The old tenses are the present and preterite; the other tenses, perfect, pluperfect, future perfect, present and perfect conditional, and perfect subjunctive, are periphrastic. The inflection of the verb is almost the same both in Pahlavi and in modern Persian, as may be seen from the following comparative table of the present Pahlavi *darīdanō*, and Persian *darīdan*, to tear:

	PAHLAVI	PERSIAN
Singular	*darēm*	*daram*
	darē	*darī*
	darēd	*darad*
Plural	*darēm*	*darīm*
	darēd	*darīd*
	darēnd	*darand*

From the grammatical sketch just given one might reasonably infer that Pahlavi was one of the easiest of languages. On the contrary it presents two problems of great difficulty. These are the alphabet and the Semitic forms which abound in the literature, which, though simple if the script were adequate, are often rendered extremely doubtful on account of the meagre alphabetical system. The Pahlavi alphabet, which is read from right to left, is based on an Aramaic script and is closely related to that of the Avesta (q.v.). There are two varieties, the Chaldæan Pahlavi, used only in two of the oldest inscriptions in the language, and the Sassanian Pahlavi, which became with some modifications the literary script, the so-called Book Pahlavi. This latter alphabet is as follows:



The ambiguity of these single characters is complicated by the ligatures, as , *am*, *ām*, *hm*, *xm*, , *madamam*, , *ahū*, *axū*, *ādn*, *āhū*, *ahn*, *āxū*, *hāv*, *hān*, *xān*, *zdān*, *ēšva*, *īšn*, *dahišn*, *īyāv*, *īyān*, *īkān* or *īgān*, *sān*, *yēhō*, etc., of which there are a little more than 100, many of which admit of several different readings. The fact must be emphasized, however, that the ambiguity is not so great as it seems at first sight. Since the alphabet is Semitic the vowels are not written, for initial *a* is a consonant in Semitic grammar, although *ī* and *ū* may be denoted, as in the Aramaic alphabet, by *y* and *v*. The Semitic words give a peculiar aspect to Pahlavi. They are not loan words, as is the case with the Arabic element in Persian, but seem to have been logograms; i.e., Semitic words were written, but Iranian words were pronounced. This may not only be inferred from the statement of Ammianus Marcellinus that Shapur II (c.309–c.379) was called *Saansaan* (i.e., *Shāhān-Shāh*, OPers. *xšāyaθiya xšāyaθiyānām*, king of kings), although his coins bear the Aramaic equivalent *malkān malkā*, but it is also stated positively by Ibn Mukaffa, who flourished about the middle of the tenth century. He says that in their spelling called *Zavārišn* one wrote for "meat" the Aramaic *bisrā*, but read for this logogram the Iranian equivalent *gōšt*, and in like manner for "bread" one wrote the Aramaic *lahma*, but read for it the Iranian *nān*. The Pahlavi which contains both Iranian words and Aramaic logograms is called Huzvaresh (Pahl. *Aūzvarišn*, Pers. *Zvāriš*, *Uzvāriš*, *Uzvārišn*). The meaning of this term is uncertain, but of the many explanations which have been advanced that which connects the word with the Avesta *zbar*, to be distorted, from which the Arabic verb *zavvara*, to conceal, distort, falsify, deceive, trick, mislead, has been borrowed, seems quite probable. If this etymology is correct the term seems to have been employed on account of the disguise of the Iranian words by the Aramaic logograms. Another plausible etymology connects the name with the obsolete Persian *zuvāridan*, to be old or worn out, in allusion to the archaic Persian found in Pahlavi as compared with the modern language. There is a native lexicon, known as the *Sasanian Frahāng* or *Frahāng-ī Pahlavig*, which gives a list of about 1300 Semitic logograms with their Iranian equivalents. The difficulties of Huzvaresh led at a later period to a transcription from the Pahlavi characters. The Semitic logograms were then omitted and in their stead their Iranian equivalents were written. The term applied to this Iranized Pahlavi is Pazand, Pazend, or Parsi, although usage differs somewhat, as some authorities call the texts Pazend and the language Parsi, while the more common and better distinction defines the transcription in Avesta letters as Pazend, while that in Persian and Gujarati script is called Parsi.

The correct forms of Pahlavi words are often problematical on account of the inadequate alphabet, and the traditional readings of many of them are certainly incorrect. The common means of determination by comparison with Avesta and Persian cognates, with the Aramaic equivalents of the logograms, and with the numerous Armenian loan words from Middle Persian, often renders a fairly accurate restoration of the original form of the Pahlavi words possible.

Pahlavi literature is of considerable extent, although its literary value is slight. It may be divided into three classes—Pahlavi translations, intermingled with commentary, of the Avesta, texts on religion, and treatises on miscellaneous subjects. Of the first class the most important published texts are the *Pahlavi Vendīdād, Yasna*, and *Vispered*, the *Hāṭōxt Nask*, the *Aogemadaēčā*, the latter two dealing mainly with eschatological subjects and with death, and the *Frahāng-ī Oīm-aēvak*, a dictionary of (Iranian) Pahlavi words, with their Avesta equivalents. Of the Pahlavi texts on religion the principal are the *Dīnkart*, a large work of which six books have been preserved, treating of Zoroastrian customs, doctrines, and literature; the *Būndahiśn*, which gives the Iranian cosmogony; the *Dātistān-ī-Dīnīk*, a series of replies to 92 inquiries on religious questions: the *Shikand-gūmānīg Vijār* (of which only the Pazend text and a Sanskrit translation are thus far known), a most important source for a knowledge of Zoroastrian philosophy, and of interest also for its criticisms of Christianity, Manichæism, and Mohammedanism: the *Shāyast-lā-šāyast*, on the duties of Zoroastrians and the dangers which beset them; the *Dīnā-ī-Maīnōg-ī Xrat*, being the answers of the Spirit of Wisdom to 72 inquiries concerning the faith; the eschatological treatises of the *Arṭā-ī-Vīrāf Nāmak* and the *Bahman Yašt;* and the *Māṭīgān-ī Yōšt-ī Fryānō*, containing Yosht's replies to 33 riddles propounded to him by the wizard Akht, whom he answers and destroys. The third division has as its most important texts the *Yāṭkār-ī Zarīrān*, a history of the war resulting from Zoroaster's conversion of Vishtaspa (see ZOROASTER), the historical romance of the *Kār-nāmak-ī Artaxšīr-ī Pāpakān*, and a geographical treatise, the *Shatrōihā-i-Airān*, which describes about 100 cities in Iran.

Important additions to the body of Pahlavi literature have been made within recent years through discoveries in Turfan, Eastern Turkestan. These valuable finds include, among other material, extensive fragments of the lost Bible of Mani, which are of the greatest importance for the history of Manichæism (q.v.). The expeditions which brought to light these sand-buried remains were due to archæological missions sent by the Imperial government of Germany, and to special researches conducted under the auspices of Great Britain as well as France and Russia. The names of Grünwedel, Le Coq, F. W. K. Müller, M. A. Stein, Pelliot, and Salemann stand out among the most prominent in this line.

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(ib., 1896), Peshotan Sanjana (ib., 1896), and Antia (ib., 1900). The large work *Dinkart* has been under publication by Dastur Peshotan Sanjana and his son, Dastur Darab Sanjana, 14 volumes of which have thus far appeared (ib., 1874 et seq.), and there is an edition of the same text by Madan, *Pahlavi Dinkard* (ib., 1911). For the most recent contributions regarding Turfan-Pahlavi, see the articles in *Sitzungsberichte der Akademie der Wissenschaften* (Berlin, 1904 et seq.), publications of the Académie Imperiale des Sciences (St. Petersburg, 1904–08); *Journal Asiatique* (Paris, 1911); *Journal of the Royal Asiatic Society* (London, 1911); and also the bibliography in *Indogermanisches Jahrbuch* (Strassburg, 1914).

PAHLEN, pä'len, Peter Ludwig (1745–1826). See Palen, Piotr Alexeievitch.

PAHVANT, pä'vänt. See Shoshonean Stock.

PAILA, pī'lȧ. A Hindu sage who, according to the Puranas (see Purana), was a pupil of Vyāsa (q.v.). When Vyāsa had composed the Vedas (q.v.) he divided them into four parts, giving one to each of his four favorite pupils. In this way Paila became the teacher of the Rig-Veda, Vaisampayana of the Yajur-Veda, Jaimini of the Sama-Veda, and Sumantu of the Atharva-Veda, while the Itihasas and Puranas, which were also composed by Vyāsa according to Indian tradition, were intrusted to Romaharshana. Consult Muir, *Original Sanskrit Texts*, vol. iii (London, 1868).

PAILLERON, pȧ'ye-rôɴ', Edouard Jules Henri (1834–99). A French dramatist and satirist, born in Paris. He began life as a notary's clerk, but at 26 gained notoriety by satiric verses, *Les parasites* (1860), and a comedy, *Le parasite* (1860). *L'Etincelle* (1879), a brilliantly witty one-act comedy, achieved great success. With *Le monde où l'on s'ennuie* (1881) popularity became fame. This is one of the wittiest satires on fashionable literary coteries ever written and is supposed to count among its *dramatis personæ* several contemporary Parisian celebrities, notably Professor Caro. In 1882 Pailleron was elected to the Academy. He wrote a few other plays, but he never equaled the success of *Le monde où l'on s'ennuie. La souris* (1887) is his only other noteworthy play. Consult his *Pièces et morceaux* (1897).

PAI-LOO, pī'lo͞o'. See Chinese Art.

PAIN (OF., Fr. *peine*, from ML. *pena*, Lat. *pœna*, pain, punishment, from Gk. ποινή, *poinē*, penalty; connected with Gk. τίνειν, *tinein*, to pay, Skt. *ci*, to avenge). A term employed by psychologists of the English Associationist school (see Association of Ideas) for what we have termed unpleasantness (see Affection), pleasure and pain being the two fundamental qualities of the affective life. But the concrete pains of everyday experience are, as even a superficial introspection shows, partly matters of sensation. "Pain," says Wundt, "is always at once a sensation and a violent feeling of unpleasantness." Modern usage goes still farther and limits the term "pain" strictly to sensation.

Under the heading Cutaneous Sensations it is noted that pain is, as a matter of fact, a distinct and specific cutaneous quality, having as its probable terminal organs the free nerve endings in the epidermis. The pain spots are constant in position, and pain maps may be drawn which furnish as permanent and valid records of the pain sensitivity as do the pressure and temperature maps of their cutaneous qualities.

Pain may also be aroused by stimulation of most of the internal organs. Muscles, tendons, joints, œsophagus, stomach, intestines, spleen, peritoneum, veins, and probably other organs are sensitive to pain. There are many kinds of organic pains, but they all appear in the last analysis to reduce to a few types, or perhaps even to a single quality. See Growing Pains; Organic Sensations.

PAIN, Barry (1867–). An English author. He was educated at Corpus Christi College, Cambridge, where he was classical scholar. For a time he was a private tutor. But as early as 1889 he had met with literary success, his "Hundred Gates" appearing in the *Cornhill* that year. In *Granta*, the Cambridge University magazine, some of his parodies and sketches had been printed, and he contributed to *Punch* and the *Speaker* and was on the staff of the *Daily Chronicle* and of *Black and White*. For a time he edited the weekly *To-day*, succeeding Jerome K. Jerome. His earlier work was humorous; later he showed himself a master of the short story. His work was little known in America until 1914–15, when he visited this country. Among his books are: *In a Canadian Canoe* (1891); *Playthings and Parodies* (1892); *Eliza* (1900); *Another Englishwoman's Love Letters* (1901); *The Shadow of the Unseen* (1907), with Blyth; *Proofs before Pulping* (1909); *Stories in Grey* (1912); *Stories without Tears* (1912); *The New Gulliver* (1913); *One Kind and Another* (1914).—His wife, Amelia, daughter of Rudolf Lehmann, wrote *St. Eva* (1897), a novel; *More Short Plays for Amateurs* (1908); *The Nine of Diamonds and Other Plays* (1913).

PAINE, Albert Bigelow (1861–). An American author and editor, born at New Bedford, Mass., and educated at Xenia, Ill. He wrote much for both children and adults and for a time was editor of a department in *St. Nicholas*. The work by which he is now best known is his *Mark Twain: A Biography* (1912), the authorized life of the great humorist, whose personal friendship Mr. Paine enjoyed. Among his many publications may be mentioned: *The Mystery of Evelyn Delorme* (1894); *The Autobiography of a Monkey* (1897); *The Bread Line* (1900); *The Commuters* (1904); *Thomas Nast: His Period and his Pictures* (1904); *The Texas Ranger* (1909); *Peanut* (1913); *Mr. Rabbit's Big Dinner* (1915).

PAINE, Charles Jackson (1833–). An American soldier and yachtsman, born in Boston. He graduated at Harvard in 1853 and made a considerable fortune in railroad enterprises. In 1861 he entered the Federal service as a captain in the Twenty-second Massachusetts. The next year he was sent to Ship Island, Miss., and in October was commissioned colonel of the Second Louisiana Volunteers, a negro regiment. During the siege of Port Hudson (May 24–July 8, 1863) he commanded a division. On March 4, 1864, he resigned, but the following July again entered the service as a brigadier general, and on September 29 led a division of negro troops at Newmarket, Va. On Jan. 15, 1866, he was brevetted major general of volunteers. During his later years he took a great interest in yachting and was owner of the *Puritan*, the *Mayflower*, and the *Volunteer*, each of which successfully defended the *America's* cup against a British challenger.

PAINE, JOHN ALSOP (1840–1912). An American archæologist, born in Newark, N. J., and educated at Hamilton College and at Andover Theological Seminary. He left the ministry to take up botanical work for the Board of Regents of New York State (1862–67), was two years professor of natural science at Robert College, Constantinople (1867–69), and acted as archæologist to the first expedition in the country east of the Jordan, sent out by the Palestine Exploration Society in 1872. He was curator of the Metropolitan Museum of Art, New York City, from 1889 to 1906.

PAINE, JOHN KNOWLES (1839–1906). An American composer, born in Portland, Me. His most important home teacher was Kotzschmar at Portland. Afterward he went to Berlin, where he studied organ and counterpoint under Haupt, singing under Fischer, and instrumentation under Wieprecht. Returning to Boston in 1861, he settled there as an organist and gave organ concerts in various cities. In 1862 he taught music at Harvard and in 1876 was appointed to the first chair of music created in an American university. Paine died in Cambridge. His early compositions belong to the strictly classical school, of which he was for years an unyielding adherent, but his later works lean towards the Romantic school. His works include: mass in D (1867); *St. Peter,* oratorio (1873); *Centennial Hymn* (1876); symphony in C minor (1876); overture to *The Tempest* (1877); overture to *As You Like It* (1878); duo concertante for violin and violoncello (1878); *Spring,* symphony (1880), in which appeared the first indications of his conversion to the Romantic school; music to *Œdipus Tyrannus* of Sophocles, for male voices and orchestra (1881); *An Island Fantasy,* symphonic poem (1888); several cantatas; chamber and pianoforte music, songs and part songs, and compositions for the organ. He also wrote *The History of Music to the Death of Schubert* (posthumous, 1907).

PAINE, MARTYN (1794–1877). An American physician. He was born at Williamstown, Vt., and in 1813 graduated at Harvard. He practiced in Montreal, Canada, from 1816 to 1822, when he removed to New York City. In 1841, with four other physicians, he founded the University Medical College (now the medical department of New York University), where he was a professor of medicine and materia medica from 1841 to 1867. Among his works the best known are: *Cholera Asphyxia of New York* (1832), based upon his observations during the cholera epidemic of 1832; *Medical and Physiological Commentaries* (1840–44); *Institutes of Medicine* (1847; 9th ed., 1870); *Review of Theoretical Geology* (1856).

PAINE, ROBERT TREAT (1731–1814). An American lawyer and patriot, one of the signers of the Declaration of Independence. He was born in Boston, Mass., graduated at Harvard in 1749, and then taught school and studied for the ministry, acting as chaplain of the Northern troops in 1755. He subsequently studied law and in 1759 was admitted to the bar. In 1768 he was a delegate to a convention called by prominent citizens after Governor Bernard had dissolved the Legislature for refusing to rescind its circular letter to the other Colonies, and in 1770 he managed, in the absence of the Attorney-General, the prosecution of Captain Preston and his men for firing upon the citizens on March 5. (See BOSTON MASSACRE.) In 1773–74 he was a member of the Massachusetts General Court and was one of the representatives of Massachusetts in the Continental Congress from 1774 to 1778. He was Speaker of the Lower House of the Massachusetts Legislature in 1777, helped draft the new State constitution of 1780, was Attorney-General of the State from 1780 to 1790, and was an associate justice of the Massachusetts Supreme Court from 1790 to 1804, when he resigned on account of deafness. Besides being an able lawyer he was well known for his scholarly attainments, and in 1805 received the degree of LL.D. from Harvard. He was one of the founders (1780) of the American Academy of Arts and Sciences. Consult John Sanderson, *Biography of the Signers of the Declaration of Independence,* vol. ii (Philadelphia, 1823).

PAINE, ROBERT TREAT (1773–1811). An American poet, born at Taunton, Mass. His name was originally Thomas, which was changed in 1801 to that of his father (q.v.). He graduated from Harvard College in 1792. In 1794 he started a fortnightly literary paper called the *Federal Orrery.* For this he wrote the *Lyars* and the *Jacobiniad,* satirical poems full of personalities; these made him bitter enemies and several times caused him to be assaulted. He then became interested in the theatre and in 1795 he married Miss Baker, an actress. The same year, upon taking the degree of A.M., he read a poem upon *The Invention of Letters,* which brought him temporary reputation, as did also *The Ruling Passion* and *Adams and Liberty* (1798). He then took to the law, studying in Newburyport under Theophilus Parsons and practicing in Boston in 1802. The last years of his life were passed in destitution. His work is without lasting qualities.

PAINE, ROBERT TREAT (1835–1910). An American philanthropist, grandson and great-grandson of two men of the same name (qq.v.). He was born in Boston, graduated from Harvard in 1855, was admitted to the bar in 1859, and retired from law practice in 1870. In 1884 he was elected to the Massachusetts House of Representatives. In 1879 he organized the Wells Memorial Workingmen's Institute, of which he was president until his death; served as president of the Workingmen's Coöperative Bank from 1886 to 1903 and of the Associated Charities of Boston from 1878 to 1907; and was head of the American Peace Society from 1891 until his death. Together with his wife he created in 1900 a trust for charitable purposes, known as the Robert Treat Paine Association, which they endowed with $200,000.

PAINE, THOMAS (1737–1809). An Anglo-American political and philosophical writer and agitator. He was born at Thetford, Norfolk, England, Jan. 29, 1737, the son of a Quaker. His schooling was over by the time he was 13, and he was then put to his father's trade of stay making. When 19 he went to sea, but soon returned. In 1759, after plying his trade for two years in London, he established himself as a stay maker at Sandwich, Kent, and in 1761 he became an exciseman. In 1765 he was discharged because, as was alleged, he had testified to having performed certain duties which he had really neglected, and went back to his trade. In 1766 his petition for restoration was granted, but he did not take up the work again till 1768, supporting himself in the interval by teaching in London, where he also preached as a Methodist. In 1759 he had married Mary Lambert (died 1760); in 1771 he married Elizabeth Ollive, who, with her mother, had kept a tobacco shop and who, with her mother's and Paine's help, subsequently opened a grocer's shop. In 1772 he was chosen by the excisemen to plead for an increase in their salaries, but was not successful. In 1774 he was again discharged from the excise service, this time on the ground, as officially stated, "of having quitted his business without obtaining the board's leave for so doing, and being gone off on account of the debts which he had contracted." In October, 1774, he emigrated to America with a letter from Benjamin Franklin to Richard Bache of Philadelphia, who introduced him to Robert Aitkin. He found employment for 18 months as an editor of Aitkin's *Pennsylvania Magazine, or American Monthly Museum*. Paine entered heartily into the spirit of the times, allying himself from the first with the Patriot or Whig party. On Jan. 9, 1776, he published his famous pamphlet, entitled *Common Sense*, in which he argued that "government, even in its best estate, is a necessary evil," that there is no warrant or reason for "the distinction of men into kings and subjects," and that the American Colonies, owing no real allegiance to the British crown, from which they had suffered innumerable grievances, "should forthwith become independent." The pamphlet expressed with great force the views of the more radical Whig element, had a remarkable influence throughout America, and did much to prepare the way for independence.

In the fall of 1776 Paine enlisted in the Continental army and for a time was a volunteer aid-de-camp on the staff of General Greene. His military experience was brief. It prompted the first issues of *The Crisis*, a series of 16 pamphlets, which were written by him over the signature Common Sense between December, 1776, and December, 1783, and which, like his earlier pamphlet, were much read and had a powerful influence over the people. In January, 1777, Paine was appointed secretary to the commission sent by Congress to treat with the Indians at Easton, Pa., and in April he was elected secretary to the Congressional Committee of Foreign Affairs. He was virtually compelled to resign, Jan. 8, 1779, because he had used in print information which had come to him in his official capacity. He became a law clerk and was clerk of the Pennsylvania Assembly for a year. In 1781 he went as secretary to John Laurens, who had been sent to France on a government mission to raise money. The two were cordially received by the King, and returned "with 2,500,000 livres in silver and in convoy a ship laden with clothing and military stores." In February, 1782, at the suggestion of Washington, Congress granted $800 to Paine on condition that he should use his pen in support of the country. In 1784 the State of New York presented him with 277 acres of land at New Rochelle and Pennsylvania with £500, and in 1785 Congress gave him $3000. He was thus relieved from poverty, and employed his leisure in experimentation, especially in perfecting his iron bridge, an invention of merit.

In 1787 Paine went to France, where he exhibited his bridge to the Academy of Sciences in Paris. He also visited England and was lionized in London by the party of Burke and Fox. He set up (1790) the model of his bridge on Paddington Green, and huge crowds went to see it. But he brought himself into odium by publishing in 1791 and 1792 his pamphlet *The Rights of Man*, in reply to Burke's *Reflections upon the Revolution in France*. Notwithstanding Burke's kind treatment of him and their former friendly relations, he accused Burke of ignorance, prejudice, and blind partisanship. The English government brought a suit against him for his attack upon the English constitution in the second part of *The Rights of Man*, and in his absence passed a sentence of outlawry (December, 1792). Paine had already gone to France. There he was enthusiastically received. The National Assembly gave him the title of citizen (Aug. 26, 1792), along with Washington, Hamilton, and Madison, and several departments elected him as their deputy to the French Convention. Paine accepted the election of Pas-de-Calais and attended the sessions of the Convention. He could not speak French, and had translations of speeches read for him while he stood upon the tribune. The most important business then in hand was the deposition of the King, and Paine was courageous enough to speak and vote against his execution. He even offered him a temporary asylum in the United States. When the Girondists, with whom he acted, fell from power, he was ejected from the Convention on the ground of being a foreigner, and on Dec. 28, 1793, was committed to the Luxembourg Prison, where he was kept for 10 months, and barely escaped the guillotine. Just before his arrest he had finished the first part of his *Age of Reason*, the famous exposition of deism, and had committed it to his friend Joel Barlow. While in prison he worked upon the second part. His release (Nov. 4, 1794) was mainly due to the change in the government. He was unanimously restored to his seat in the Convention, and sat there until its adjournment (Oct. 26, 1795). In the same year he attracted considerable attention by making a bitter attack upon Washington, whom he charged, among other things, with inefficiency and treachery.

Paine returned to America in 1802 and landed at Baltimore October 30. He found that his services in the cause of the Colonies were in some quarters gratefully remembered, but that his *Age of Reason* had cost him the esteem of the religious part of the community. He suffered also from ill health, and was lonely and wretched. He lived successively at Bordentown, N. J., at New Rochelle, N. Y., and in New York City. He died in New York, June 8, 1809, and was buried in New Rochelle, where a monument was erected to him in 1839, although his body had been exhumed and carried to England by direction of William Cobbett in 1819. As a writer Paine was forceful and original. His versatility is shown by the variety of the topics which engaged his attention. His influence as a pamphleteer was immense. The attack he made upon the Bible was unscholarly, but shrewd and pointed. His defiant assertion of deism brought him into great ill repute in his time. His *Common Sense* was reissued in 1912 (New York). The best edition of his works is by Moncure D. Conway (4 vols., New York, 1894–96; new ed., 1914), who has also written his biography (ib., 1892; condensed ed., 1902). Consult also: the *Life* by T. C. Rickman (London, 1814; republished, with other material, ed. by D. E. Wheeler, New York, 1909); the *Life* by G. Vale (ib., 1841); and M. C. Tyler, *Literary History of the American Revolution* (ib., 1896).

PAINE, WILLIAM H. (1828–90). An American engineer, born at Chester, N. H. He did much to improve roads and engineering methods in California in 1849, surveyed a line for a railroad from Sacramento to Utah (1853), and in 1861 volunteered in the Union army. He served throughout the war, attained the grade of colonel, and made valuable maps. He worked under Roebling as consulting engineer on the Brooklyn (N. Y.) Bridge, and for a time superintended the entire work. The railway cable system on the bridge was planned by Paine, and he built and engineered cable roads in New York City, Omaha, Denver, Kansas City, and Cleveland.

PAINESVILLE, pānz′vĭl. A city and the county seat of Lake Co., Ohio, 29 miles east by north of Cleveland, on the Grand River and on the New York, Chicago, and St. Louis, the New York Central, the Fairport, Painesville, and Eastern, and the Baltimore and Ohio railroads (Map: Ohio, H 2). It is the seat of Lake Erie College, opened in 1859, and has a public library, a fine courthouse building, a high school, and a hospital. A massive stone viaduct spans the river at this point. Painesville is of considerable commercial importance, being situated but 3 miles from Fairport, on Lake Erie, where there is a fine natural harbor with extensive ore docks. The city lies in one of the best and most extensive nursery regions in the country. Its industrial establishments include a large school supply factory, a soda-ash plant, a grain elevator and flouring mills, foundries and machine shops, and large veneer-machine and automobile works. The water works and electric-light plant are owned by the municipality. Pop., 1900, 5024; 1910, 5501.

PAINLEVÉ, păɴ′le-vâ′, PAUL (1863–). A French mathematician, born in Paris. He attended the Ecole Normale Supérieure in 1883–86, was employed on a mission to Germany in 1886–87, and received his doctor's degree in science in the latter year. He then had charge of a course in mechanics at the University of Lille in 1887–92, was called to lecture at the Sorbonne, taught mathematics at the Ecole Normale between 1895 and 1903, thereafter was professor of general mathematics at the University of Paris, and later held a similar position also at the Polytechnique. Painlevé was elected to the Institute in 1900. Under Briand he became (October, 1915) Minister of Public Instruction and Inventions concerning National Defense. He published: *Leçons sur le frottement* (1895); *Leçons sur la théorie analytique des équations différentielles* (1897); *L'Aviation*, with Emile Borel (1910; Ger. trans., 1911).

PAINT. See PAINTS.

PAINT, LUMINOUS. See LUMINOUS PAINT.

PAINT, MINERAL. A term applied to mineral substances which are mined, ground, and sometimes purified for use as pigments. It includes a variety of natural materials as well as some artificial products. The essential characteristics are permanence of color and sufficient adhesion, when applied to a surface, to prevent scaling and to keep out moisture. The following groups may be recognized, and under each the more important types defined.

Natural Mineral Pigments. Ochre, a hydrated ferric oxide, of clayey texture, good grades containing 20 per cent or more ferric oxide; the color and amount of oil required for mixing affect its value. Georgia and Pennsylvania yield over 80 per cent of the domestic product. Umber is essentially an ochre colored by manganese oxide; it is drab in the raw state, but the calcined or burnt umber is reddish brown. Sienna is similar to umber but of a lighter color. Umber is produced in Pennsylvania and California, but the imported product is preferred on account of its better color. Metallic paint, chiefly red and brown iron oxides, is produced either by grinding natural iron oxides or by roasting natural iron carbonate. The product is obtained from the Clinton hematite of the Eastern States, the red hematite of northern Michigan, and the gray siderite of Lehigh Gap, Pa. Other products included under this head are ground blast-furnace dust, yielding a seal-brown powder; the residue derived from roasting pyrite; and a ferruginous claylike residue left after extracting the aluminium salts from bauxite. Copperas roasted with lime or gypsum is also sold as a metallic paint. The metallic paints, if of good grade, are not attacked by atmospheric agencies, and are much used for painting structural ironwork and railroad cars. Slates and shales are ground and used as pigments and as fillers in oilcloth and linoleum manufacture. Red, black, and yellow shales are utilized. Whiting, a white pigment, is made either by grinding white limestone or calcite, or else artificially, in which case it is finer grained and lighter in weight. It is used in putty manufacture and to some extent in ready-mixed paints. Barites in its ground form yields a white pigment, now much used. Graphite paint, much used for iron and steel work, carries often from 35 to 40 per cent graphite in the pigment, the remainder being mostly siliceous, aluminous, and ferruginous material. The graphite is mostly of the amorphous variety.

Pigments Made Directly from Ores. Zinc oxide is a white powdery product obtained by roasting zinc ores, such as the oxide from New Jersey, sulphide ores from the Mississippi valley and the West, and silicate and carbonate ores. It forms a white, stable, opaque pigment of great value in a combination formula. Leaded zinc oxide is a pigment consisting of zinc oxide and from 6 to 20 per cent lead sulphate. Sublimed white lead is a basic lead sulphate obtained by volatilizing lead sulphide (galena) in a furnace in the presence of carbon and air. The product is a pigment of great fineness, snow-white color, and very opaque, but must be mixed with coarser pigments to give it tooth.

Chemically Manufactured Pigments. Basic carbonate of lead is made from metallic lead by several different processes, yielding a valuable white pigment, whose wearing properties are increased by mixing it with zinc oxide or other pigments. Red lead is obtained by heating litharge in reverberatory furnaces. It is used alone or mixed with other paints for coating iron or steel. Litharge, the lead monoxide, is a buff-colored powder, used in paints. Orange mineral is a higher oxide of lead, of bright orange color. Lithopone is a white pigment composed of 70 per cent barium sulphate, 25 to 29 per cent zinc sulphide, and 1 to 5 per cent zinc oxide. If exposed to the weather it darkens, and hence has to be mixed with more stable pigments, but interiorly it is widely used for the manufacture of enamels and flat wall finishes. (See Barite.) Venetian red is obtained by a mixture of red iron oxide and gypsum.

The value of mineral pigments marketed in the United States in 1913 was as follows:

Ochre	$173,944
Umber Sienna	20,790
Metallic paint	171,264
Mortar colors	35,443
Slate and shale	120,969
Pigments made directly from ores	9,020,896
Basic lead carbonate	18,112,219
Red lead	2,127,976
Litharge	2,524,707
Orange mineral	71,625
Lithopone	2,170,445
Venetian red	116,195
Total	$34,666,473

Bibliography. C. D. Holley, *Lead and Zinc Pigments* (New York, 1909); Gardner and Schaeffer, *The Analysis of Paints and Painting Materials* (ib., 1910); Houston Lowe, *Paints for Steel Structure* (5th ed., ib., 1910); also Watson, "Ochre Deposits of Georgia," in *Georgia Geological Survey, Bulletin 13* (Atlanta, 1906); Miller, "Paint Shales of Pennsylvania," in *Pennsylvania Topographical and Geological Survey, Report No. 4* (Harrisburg, 1911). For statistics and an extensive bibliography, consult *United States Geological Survey, Mineral Resources* (Washington, 1913).

PAINTED QUAIL. 1. The mountain quail (*Oreortyx pictus*). (See Quail.) 2. A small quail-like partridge of China (*Excalfactoria chinensis*), found from India to Ceylon and Formosa. It has a plumage of varied colors, in which chestnut is conspicuous, and is much hunted. A darker race inhabits the Philippines, Malayan islands, and Australia; and similar species occur in New Britain and neighboring islands and in Central and southern Africa. The Australian form is called least swamp quail.

PAINTED TURTLE, or Painted Terrapin. The commonest pond turtle (*Chrysemys picta*) of the eastern United States. It is greenish above with yellow and red markings and yellow and brown below.

PAINTER, William (?1540–94). An English translator, educated at St. John's College, Oxford. In 1560 he became clerk of the ordnance in the Tower of London. Notwithstanding his denials, he seems to have pilfered the Queen's funds. He is known for *The Palace of Pleasure* (vol. i, 1566; vol. ii, 1567), a collection of 100 tales, translated from Latin, Greek, French, and Italian. Painter may be said to have made Bandello, Boccaccio, Cinthio, and various other Italians familiar to English readers. The collection was immensely popular and led to many similar compilations. From it the English dramatists drew freely for their plots. Consult the reprint, edited by Joseph Jacobs (3 vols., London, 1890).

PAINTER-ENGRAVER. An artist who engraves his own designs, i.e., an original engraver, one occupied in expressing his artistic thoughts by means of some process of engraving, as distinguished from one who engraves the designs of others. The term is adopted from the French, *peintre-graveur*. Albrecht Dürer was very eminent as a painter-engraver with the burin; Rembrandt in etching; J. M. W. Turner in mezzotint. So, among men of a later period, there may be named Gaillard in line work and Whistler as an etcher. Consult the bibliography of Engraving.

PAINTERS' COLORS. The number of colors used by painters in their art has varied greatly. Until the time of Apelles but four were known—white, yellow, red, and black. Green, purple, and blue were discovered later. The discoveries of modern chemistry have greatly increased the number available, which are derived from the mineral, vegetable, and animal worlds. But although the painter of the present day has a long list to choose from, a dozen is quite sufficient for the richest palette. They are prepared for use by calcining and washing; oil paints are ground in poppy or linseed oil and preserved in tin tubes. In general, colors are either opaque or transparent, the former being used for the lights, the latter for the shadows and dark portions of the picture. For the sources and character of painters' colors, consult the subdivision *Pigments* of the article Paints, and the articles on the special colors, such as Blue; Carmine; Purple Colors; Ultramarine; etc. For the quality of color in a painting, see Color.

PAINTING. In art, the laying of pigments on a surface for purposes of decoration or representation of natural or imagined objects. There are thus two varieties of painting, decorative and representative. The present article, however, is concerned chiefly with the latter, and with the former only in so far as it is representative. In painting the color is applied with a brush of varying size and fineness, or with the pencil, as in the case of pastel; sometimes with the assistance of the palette knife and finger tips. According to the surface used painting is mural (see Mural Decoration) or easel, the latter variety including panel and canvas (q.v.). As regards the medium or vehicle with which the color is mixed, painting is encaustic, fresco, tempera, oil, pastel, or water color (qq.v.). According to the subject represented the principal varieties of painting are figure, genre (q.v.), historical, portrait (q.v.), landscape (q.v.), animal, and still life (q.v.). The technical qualities of paintings, by which it is adjudged good or bad, are treated under the headings Chiaroscuro; Color; Composition; Line; Perspective; Values.

The earliest survivals of painting belong to the Paleolithic period (q.v.), about 50,000 b.c., to a time when the mammoth and other animals now extinct roamed over Europe. The cave dwellers of western and southern France incised on bone remarkably naturalistic drawings of the prehistoric animals they hunted. In a cave at Altamira, near Santander in northern Spain, are remarkable wall paintings of the same period representing prehistoric animals in three colors, impressionistic in execution and showing amazing skill in rendering movement. During the Neolithic period (q.v.) this taste for design declined, nor did it again revive until a more advanced social stage required the graphic representation of natural objects for the purposes of commemoration. This stage is first seen in Egypt and Babylonia, and with it the history of painting begins.

The present article is devoted to the evolution of painting since its rise as an independent art in the western world. In the Orient painting has maintained a decorative character and is closely associated with calligraphy and literature, in Persia chiefly as miniatures. It is therefore treated under such headings as Chinese Art; Japanese Art; Indian Art; Persian Art. In the art of the Near East painting can hardly be said to have existed independently in Babylonia and Assyria; but in Egypt it was used in connection with low-relief sculpture (q.v.), or even on flat surfaces, but in purely decorative and conventional manner without perspective or effects of light and atmosphere, albeit with a certain naturalism and excellence of line. (See ASSYRIAN ART; BABYLONIAN ART; EGYPTIAN ART.) In Greece painting attained the rank of an independent art, vying with sculpture in its achievements; but its productions were chiefly decorative and intimately connected with the other arts. (See GREEK ART.) Roman painting was an offshoot of the Greek, and more than it dependent upon architecture. (See ROMAN ART.) This was preëminently the case in the mediæval epochs, where painting was decorative in character, usually the handmaiden of architecture, and always so closely associated with the other arts that it should be treated in connection with them. See BYZANTINE ART; CHRISTIAN ART; GOTHIC ART; ROMANESQUE ART.

THE PROTO-RENAISSANCE

Italy. The development of painting as an independent art in modern times begins with the late Gothic epoch in Italy. For Italian Gothic architecture was designed with large wall surfaces which afforded ample opportunity for fresco (q.v.) painting. About the middle of the thirteenth century a number of painters in different parts of Italy began to modify, though at first slightly, the Byzantine manner. The most important of these painters was Cimabue of Florence (died c.1302), whose break with tradition took the form of a slight naturalism. But by far the greatest progress before the Renaissance was made by Giotto (1266–1337) of Florence. It is generally accepted that he was a pupil of Cimabue, but he was also influenced by the classic conceptions of the Roman school. In his frescoes the faces are still typical, rather than individual, but they are strong and the figures are dramatic in action and very characteristic. The drapery is no longer stiff, but falls in broad masses, showing the movement of the body beneath. The accessories, such as animals, landscape, and architecture, are symbolic and conceived in a decorative sense, as is indeed the entire composition. The scale of color was limited and determined by decorative harmonies, the method being to fill in the outlines with color. What most impressed contemporaries was his great step towards naturalism. Seldom has an artist dominated an epoch as did Giotto the fourteenth century. The most important of his followers was Andrea Orcagna (died 1368), who, in his startling frescoes and altarpiece in the Strozzi Chapel, Santa Maria Novella, Florence, surpassed Giotto in depicting the human figure and in the treatment of light and shadow, and even had an elementary knowledge of perspective, anticipating the discoveries of the Renaissance.

The other great centre of painting was Siena. Its art was conservative in character, based upon Byzantine traditions, lyric in sentiment, and essentially decorative in its effects. Duccio (died 1339), the real founder of the school, developed the Byzantine style to the highest perfection. His majestic altarpieces are the culmination of mediæval panel painting in Italy. Simone Martini (died 1344), his chief follower, continued the same tendencies, developing "types of beauty strange and penetrating" in an ultra-refined and subtle art. A more progressive tendency is represented by the Lorenzetti brothers, who in their numerous frescoes introduced a specifically descriptive style. At Rome a native school, the chief master of which was Pietro Cavallini (late thirteenth century), developed under the influence of classic mosaics. Elsewhere in Italy the manner of Giotto prevailed throughout the fourteenth century, even in Naples and the south, but none of these local groups were important except those of Verona and Padua, where schools, inspired by the work of Giotto in the Arena Chapel, arose. The most important master of this region was Altichiero da Zevio of Verona, who worked conjointly with Jacopo Avanzi.

As painters of the transition from the Middle Ages to the Renaissance may be classed Gentile da Fabriano (died 1428), an Umbrian of delightfully narrative and poetic art, and Fra Angelico (died 1455), the religious painter par excellence, who expressed mediæval ideals in the pictorial language of the Renaissance.

THE RENAISSANCE (1400–1600)

The Renaissance (q.v.), as its name implies, was a conscious attempt to revive the glory of antique art. But it endeavored also to reveal the beauties of nature, especially in painting, since no ancient paintings survived. The epoch is divided into three divisions—the Early Renaissance, corresponding, roughly speaking, with the fifteenth century, an age of naturalism; the High Renaissance (c.1500–50), in which the classic influence predominated; and the Decline (c.1550–1600), when a mannered style prevailed.

Early Renaissance: Italy. Italian painting had the great advantage of flourishing contemporaneously with a high intellectual and a very general artistic development, based on scientific knowledge of natural laws. The laws of linear perspective (q.v.) were discovered and applied by Brunelleschi and Alberti; anatomy was scientifically studied; and the study of the antique tended to idealize art and afforded decorative motives. Finally, a natural tact prompted them to subordinate detail, while not neglecting it, to higher poetic truth.

During the fifteenth century Florence was the chief centre of Italian art. Here the Renaissance began and here the principal problems of painting were solved for future times. The city's chief painters were pioneers as great in intellect as in art, wherein they excelled in every technical quality except color. (See FLORENTINE SCHOOL OF PAINTING.) The first painter who can be distinctly classed as belonging to the Renaissance is Masolino (1383–1447), whose works show advance in perspective, composition, and anatomy. All of these qualities were achieved to a far greater extent by Masaccio (1401–28), the most prominent figure in Italian painting between Giotto and High Renaissance. To a remarkable sense of the significant, shown in the elimination of all unnecessary detail, he added great power of emotional expression in his powerful and dramatic figures. His frescoes in the Brancacci Chapel were the models of the century, and their direct influence may be seen in the works of Michelangelo and Raphael.

None of Masaccio's followers or contemporaries equaled him. A group of Naturalists, chief among whom were Paolo Uccello (1397-1475), Andrea del Castagno, Domenico Veneziano, and Alesso Baldovinetti, developed and applied the maxims of perspective and carried realism to the utmost lengths. Masaccio's real successor, Filippo Lippi (1406-69), was the first to depict the Madonna as a Florentine mother and the holy personages as his healthy, robust, and good-humored compatriots. Sandro Botticelli (c.1444-1510) is perhaps the most representative Florentine painter of the century. For he depicted both the religious and the pagan side of the Renaissance in his dreamy madonnas and large mythological panels, both replete with poetry and deep spirituality. Filippino Lippi's (1457-1504) painting, modeled upon that of his father and Masaccio and influenced by Botticelli, is also full of grace and sentiment.

Among other Florentine painters of the period were Benozzo Gozzoli, a pupil of Fra Angelico, whose charming frescoes reflect the life of his epoch, and Piero di Cosimo, a charming narrator, known by his mythological pictures. Another distinct group was composed of painters who were at the same time sculptors, the Pollaiuolo brothers, especially Andrea (1429-98), and Andrea del Verrocchio (1435-88). Their principal contribution to the development of painting was in the rendition of movement and of the nude, and Verrocchio was the first among Florentines to render light and atmosphere. Among Verrocchio's pupils were Leonardo da Vinci (see below) and Lorenzo di Credi, whose work is less strong than graceful. Finally, Domenico Ghirlandaio (1449-94) combined in his art the various tendencies of the century, being an able technician and a pleasing artist, but one who lacked the genius to produce a new style.

During the fifteenth century the Sienese school, little affected by the Renaissance, remained true to its mediæval ideals, producing an art important chiefly as decoration and affording little room for individuality. But in central Italy new and important schools arose, distinguished by illustrative talent, good color, and space composition. The most northern of these, sometimes called the Umbro-Florentine, is closely connected with Florence. Its founder, Piero della Francesca (died 1492), studied there with the Realists, of whom he is the greatest. He was the first Italian to master light and atmosphere and to achieve high excellence in landscape. Of his pupils Melozzo da Forli (1438-94) obtained remarkable results in foreshortening, and Luca Signorelli (died 1523) was the first to use the human nude rather than facial expression to depict emotion, foreshadowing Michelangelo. The Umbrian school (q.v.), i.e., the painters of the city and vale of Perugia, produced an art characterized chiefly by ecstatic, religious sentiment. This quality appears in the art of Niccolò da Foligno (died 1502), a pupil of Gozzoli, and Benedetto Buonfigli (died 1496) and Fiorenzo di Lorenzo (died 1521), both of Perugia. The last named studied at Florence, as did also Pietro Perugino (1446-1523), the master of Raphael, in whose work culminated the Umbrian style and sentiment of the fifteenth century. Although deficient in drawing, he achieved grace in composition and richness of color. The art of Pinturicchio (1454-1513) resembled that of Perugino in type and sentiment, save that it was decorative in character. At Rome the popes were munificent patrons, but there was no native school, the talent being imported from other parts of Italy. Nor was there a noteworthy native school in Naples or in Sicily, where the taste rather inclined to the art of the Netherlands. But a single great name appears, Antonello da Messina (died 1479), a realist of high coloristic talent, who introduced oil painting into Venice.

There is no connection between Paduan painting of the fourteenth century and the school established by Francesco Squarcione (q.v.) in the latter half of the fifteenth. Its chief characteristics were the statuesque character of the figures, which were studied from the antique and the works of Donatello at Padua, the wealth of classic ornamentation employed, and a trenchant realism. Andrea Mantegna (1431-1506), the chief master of the school, understood the antique more thoroughly than any other painter of the Early Renaissance, and achieved the greatest results of the century in foreshortening. In its influence on painting Padua was for Venice and the North what Florence was for central Italy.

At Venice Byzantine art dominated longer than anywhere else in Europe. The transition to greater freedom took place in the fifteenth century, largely through the influence of Gentile da Fabriano, especially on the school of the outlying island Murano. The chief representatives of this school belonged to the Vivarini family, whose work also shows Paduan influence. Their pupil, Carlo Crivelli (died c.1495), was more influenced by Padua in his intensely individual art, which was archaic and highly decorative in character and profoundly pathetic. The eldest member of the Bellini family, Jacopo (died 1470), a pupil of Gentile da Fabriano, accepted the Renaissance at Florence and became an eager student of its problems. His són, Gentile (died 1507), the first great painter of pageant pictures in Venice, achieved mastery of open-air effects. This Gentile's younger brother, Giovanni (died 1516), is the most important figure in early Venetian painting. At first under Paduan influence, he later developed those qualities of painting distinctly Venetian—the union of noble form with golden tone and soft melting color. Vittore Carpaccio (died c.1525), an assistant of Gentile Bellini, painted pageant pictures illustrating in an incomparable manner and with real pictorial qualities Venetian life of his day. Among Giovanni's earlier pupils was Cima da Conegliano (died 1517). The later pupils included the greatest masters of the early High Renaissance.

At Ferrara a school arose whose work was done chiefly under Paduan influence, but was more charming in color. (See FERRARESE SCHOOL OF PAINTING.) The founder was the austere Cosimo Tura (died 1498?), whose chief pupils were Francesco Cossa, Ercole Roberti, and Lorenzo Costa (1460-1535), a pupil of the two last named. Costa afterward removed to Bologna, where his rugged and manly style was softened by Umbrian sentiment. He was in partnership with and greatly influenced Francesco Francia (1450-1518), in whose gentle art Umbrian sentiment preponderated. The work of Francia's pupil Timoteo Viti (1469-1523) is pervaded by fine poetic feeling.

In the Lombard cities Pisanello (c.1385-1455), a follower of Altichiero, influenced by Gentile da Fabriano, represents the transition to the Renaissance at Verona. Here in the late fifteenth century an important independent development began, at first under Paduan, then under Venetian influence. The chief masters were Liberale (died 1536), Domenico Morone (died c.1593), Caroto (died 1556), and Cavazzola (died 1522), the two last named belonging to the High Renaissance. The founder of the Milanese school was Vicenza Foppa (died after 1502), of Brescia, trained at Padua or Verona. Foppa originated an independent style with soft outlines and silvery shimmering color effects, which was further developed by his pupil Borgognone (died 1523) and culminated in Luini. Bramantino (died 1529), in his powerfully designed frescoes, is the foremost representative of the decorative style introduced by the architect Bramante (q.v.).

High Renaissance: Italy. The highest development of Italian painting falls, roughly speaking, in the first half of the sixteenth century, though the Venetian school maintained its excellence almost to the end of the century. A deeper study of the antique brought artists nearer the ideal type. Most of the leaders of the movement were either born or trained at Florence. Leonardo da Vinci (1452–1519) was the pioneer. The greatest all-round scientist of the day, besides being a musician and a sculptor, he was also the foremost theorist on art, which especially qualified him for teaching. He achieved the greatest mastery hitherto attained over atmosphere, light, and modeling. Though Michelangelo Buonarroti (1475–1564) was primarily a sculptor, no artist of the Renaissance had a greater influence on painting, for in his great fresco cycle in the Sistine Chapel he achieved the highest in his drawing of the human figure and in decorative effect. The whole epoch was impressed by his tendency towards the gigantic in form and the violent in action. Directly the opposite was Raphael (1483–1520), whose art was a composite of the best elements in Middle Italian art. Himself an Umbrian, he imbibed poetic sentiment from Timoteo Viti and tenderness from Perugino; at Florence he learned composition from Fra Bartolommeo, modeling and subtle charm from Leonardo, and from Michelangelo dramatic action and power. But all these qualities were duly assimilated in an art pervaded by a wondrous harmony distinctly his own. He excelled especially in space composition and in illustrative talent.

Even after this great trinity, Da Vinci, Michelangelo, Raphael, had left Florence, important artists remained. Fra Bartolommeo (1472–1517) was the first to portray that majestic combination of character, form, and strict architectural composition typical of the High Renaissance. His coworker Albertinelli (1474–1515) has an art resembling his, though it is less religious. Of greater importance than either was Andrea del Sarto (1486–1531), the best colorist of the Florentine school, in fresco as in oils. In brushwork, warmth of color, and atmospheric effects he reached a higher level than had others up to that time.

At Milan, from about 1485 till 1499, Leonardo da Vinci was at the head of the academy founded by Lodovico Sforza, exercising a predominant influence upon painting there. The most important of his pupils and followers were Andrea Solaro (born c.1460), who attained many of his master's high qualities; Bernardino Luini (died c.1540), the most important of the group, in whose art Leonardo's vigor is replaced by grace and pathos; and Gaudenzio Ferrari (died 1546), who was grander in style and more brilliant in color, but often excessively sentimental. Among the less important painters of the school were Beltraffio (1467–1516), Marco d'Oggiono (died 1530), and Cesare da Sesto.

Properly speaking, there was no distinctly Roman school of painting, the term being applied to the pupils of Michelangelo and Raphael and to the Mannerists who labored there after them. Of Michelangelo's followers the principal was Sebastiano del Piombo (died 1547), a Venetian and a pupil of Giorgione, whose high coloristic talent was spoiled by an attempt to unite Venetian color with Michelangelo's line; others were Marcello Venusti (born 1515) and Daniele da Volterra (1509–66). Of Raphael's pupils Giulio Pippi (Romano) (1492–1546) was the chief, but even in his work Michelangelo's influence is predominant. Though excellent as a draftsman his violent compositions tended towards the baroque. Others among Raphael's pupils were Francesco Penni (died 1528), Giovanni da Udine, Perino della Vaga (1500–47), and Polidoro da Caravaggio, the last three being mainly decorators. Andrea Sabbatino (died c.1545) transmitted Raphael's art to the south of Italy, where it prevailed for the remainder of the century.

At Siena the chief master in the sixteenth century was Antonio Bazzi (1477–1549), generally known as Sodoma, who was a pupil of Leonardo and who treated the human figure with much grace and expression. The most important of his numerous pupils was Baldassare Peruzzi (1481–1536), an architect and a fine decorative painter.

The painters of Ferrara and Bologna are often classed as followers of Raphael, though wrongly so, since they maintained a distinct local character. Their chief characteristics were a pure cool scheme of color, a less conventional composition than the Romans, and an original use of the landscape as background. The most important representatives were Dosso Dossi (c.1479–1542), a pupil of Costa, who was also influenced by the Venetians, and Garofalo (1481–1559), who combined vivid and attractive color with a suavity learned from Raphael. The High Renaissance in northern Italy (outside of Venice) found its greatest master in Correggio (1494–1534). The pupil of various obscure masters, but active chiefly in Parma, he was the principal exponent in the Renaissance of the purely material beauty of things, and of poetic sensuality. Technically he was unsurpassed in foreshortening and was the greatest master of light and shade in Italy.

The Venetian school of painting (q.v.) differed from others principally in that it sought chiefly pictorial effects. Its painters developed color as it had been developed nowhere else in the world, treating light and shade in such a manner as to bring out all local tints, and were the first to achieve broad and facile brushwork. The pioneer was Giorgione da Castelfranco (c.1478–1511), who depicted in soft melting colors and with subtle effects of light and shadow both landscape, which he created on a new and unprecedented scale, and the nude, which he was the first to render in the modern manner. The principal painters of the day adopted his style. Palma Vecchio (died 1528), a rugged master, created strong healthy female types in remarkably rich colors. Among the many followers of Giorgione and his circle are Bonifazio Veronese, a very worldly master; Pordenone of Udine (died 1539), an able fresco painter; and Paris Bordone, a pupil of Titian. At Bassano the Da Ponte family, especially Jacopo (1510–92), painted for the first time in Italian art peasant genre in fine landscape.

As a painter pure and simple Titian (1477–1576) was the greatest of the Italian school. He was the first to handle a brush with absolute freedom and facility, and in his art the sensual beauty, harmony, repose, and the gorgeous glow of color of the Venetian school found culmination. A pupil of Bellini, influenced especially by Giorgione and somewhat by Palma, he achieved an art of unprecedented scope and power, reflecting in its long course the sentiment of almost the entire Venetian Renaissance. Lorenzo Lotto (died 1556) represents the spiritual side of the Catholic reaction.

The Renaissance lasted longer in Venice than elsewhere, and almost to the end of the century painters of the highest rank appear. Among these Tintoretto (1518–92) sought to combine with the color of Titian the line of Michelangelo in his impetuous but grandiose and thoroughly original style. Paolo Veronese (1528–88), both by birth and by early training identified with Verona, continued in his fine decorative frescoes and panels the original tendencies of the Venetian school, developing the worldly side of its painting to the highest degree. He was par excellence the great painter of banquet scenes.

The artistic influence of Venice extended also to its subject territories on the mainland. Though under Venetian influence the Brescian school had very distinct characteristics, chief among which was a silvery tone. Its chief master was Moretto (1498–1555), a very individual artist, able in composition, fine in line, and delicate in color. His pupil Moroni (died 1578) excelled in his portraits, which are essentially modern and realistic in spirit.

The Decline. As early as 1530 the decline of the Renaissance in Italy began. In the forms of Raphael and Michelangelo the Mannerists (q.v.) executed great crowded compositions, of exaggerated action and striking effects of light and shade, and only in portraiture were they tolerable. At Florence Bronzino (died 1572) and Vasari (1511–74) were among the chief masters; at Parma, Parmegiano (1504–40); at Urbino, Barocci (1528–1612), who followed Correggio; at Rome, the brothers Zuccari and many lesser masters. The Sienese school alone remained absolutely true to nature, as did Luca Cambiaso (1527–85) at Genoa. At Venice the Mannerists came later, and maintained still something of the glory of Venetian color, as is evident in the dashing technique of Palma Giovane (1544–1628) and the fine color of Padovanino (1590–1650).

Netherlands. Contemporary with the Italian development there arose in the fifteenth century important schools of painting in the Netherlands, especially in Flanders, under the patronage of the Duke of Burgundy and of the wealthy cities. In the second decade of the century this art appears fully developed in the Ghent altarpiece by the brothers Van Eyck, showing pictorial qualities far more highly developed than in contemporaneous Italian painting—the complete mastery of the technique of oil colors, a trenchant realism, the use of landscape backgrounds, and a mastery of aërial perspective. The painting which preceded this development can be studied only through the analogy of late Gothic sculpture and manuscripts; like them it also was Gothic in spirit. Huybrecht van Eyck (died 1426), who first perfected the oil technique, belongs to the Middle Ages in his grandiose and solemn art. Jan van Eyck (died 1441) was a powerful, objective realist with a highly finished, almost miniature execution; he founded the school of Bruges. His chief contemporaries were Rogier van der Weyden (died 1464), head of the Brussels school, whose art was more archaic but more dramatic and religious; the quaint and even more archaic Maitre de Flamalle; and Dierick Bouts (died 1475), who was trained at Haarlem, the chief centre of the Dutch school, but who established a school at Louvain. His art, which is typical of the early Dutch school, is more subtle in color, excelling in space and atmosphere, but deficient in drawing of the figure. Towards the late fifteenth century the development was towards greater freedom of presentation. The chief master of the second generation was Hugo van der Goes (died 1482), active chiefly at Ghent, but whose Dutch origin is evident in the superior treatment of chiaroscuro and of landscape. His contemporary, Albrecht Ouwater, of Haarlem, is not the founder of the Dutch school, but a painter whose art is more advanced than that of Bouts. Hans Memling (died 1495), born in Germany but active at Bruges, was a master of profound yet calm religious sentiment and painted with delicacy and refinement. His successor, Gerard David (died 1523), represents the culmination of the best elements in early Dutch and Flemish art, both in figure and in landscape painting.

In the early sixteenth century the centre of Flemish art shifted from Bruges to Antwerp. Quinten Matsys (1460–1530), chief master of Antwerp, though his art was still Old Flemish in spirit, represents the transition to the Italianized painting of the sixteenth century, for he introduced life-size figures and Renaissance backgrounds. His Dutch contemporary, Lucas van Leyden (1494–1533), in his very original works, painted more thoroughly in the spirit of the Renaissance. The painters following, both Flemish and Dutch, continued the effort to graft Italian art upon the Netherland stock. Among the principal Flemish representatives of this tendency are: Jan Mabuse (died 1541), Bernaert van Orley (died 1542), Lambert Lombard (1505–66), and Frans Floris (died 1570). Of greater independence were the portraitists Jan van Scorel and Antonis Mor and the landscapists Joachim Patinir (died 1524), Hendrik Bles (Civetta), Paul Bril, and the Breughels.

Germany. During the fifteenth century a Renaissance had also begun in Germany, differing from the Flemish in that, although showing a strong impulse towards realism, it retained the gold backgrounds with an innocent fervor and a graceful sentimentalism derived from the Gothic. The chief seat of this art was Cologne and its principal master was Stephan Lochner (died 1451). About 1450 the Flemish influence made itself felt in Germany, and during the same period important local schools flourished in southern Germany, commonly grouped together under the name of the Swabian school. At Kolmar the chief master was Martin Schongauer (died 1488). The chief seat of the school of Franconia is Nuremberg and its principal master is Michael Wolgemut (1434–1519). Nuremberg also dominated the art of Bohemia, Silesia, and Poland (Cracow).

In the early sixteenth century German painting reached its highest development. Gradually emancipating itself from the detailed execution incidental to its connection with engraving, it paid more regard to the ensemble, and while holding fast to the realism peculiar to German art, it aimed at a loftier and more ideal treatment. Although this change was in part due to Italian influence, German painting continued to maintain a distinctly national character.

It was reserved for Nuremberg to produce the most original and imaginative German artist of all times. The pupil of Wolgemut, Albrecht Dürer (1471–1528), inherited the angularity of line and detail of the German school. The Italian influence (Barbari and Bellini), to which he was subjected, tended to soften and idealize his art, but without loss of individuality. Perhaps greatest as an engraver, he was, nevertheless, strong and effective as a painter, admirable in line, and often excellent in color. His pupils Schäufelin and Hans von Kulmbach combined his style, the latter inclining more to Italian methods. Followers of Dürer also were the Little Masters, rather engravers than painters, and so called because of the size of their plates. They included such artists as Georg Pencz (died 1550) and the two Behams.

In the sixteenth century the centre of the Swabian school shifted from Kolmar to Augsburg, where the Renaissance developed a more restful composition, better use of color, and more sense of the ensemble than anywhere else in Germany. The founder of the school was Hans Burkmair (1473–1531), a pupil of Schongauer, and about 1508 Hans Holbein the Elder adopted the Renaissance, bequeathing to his son his realistic style and conception. Hans Holbein the Younger (1497–1543), the greatest painter Germany ever produced, excelled in all the essentially pictorial qualities. By predilection a master of light and shade, he was required by English taste to adopt a miniature style excluding both. In trenchant realism, as in powerful objective characterization, he has never been surpassed. At Aschaffenburg, near Mainz, flourished Matthias Grünewald, the "Correggio of Germany," unique among German painters in his attention to color, light, and atmosphere rather than detail. At Regensburg Albrecht Altdorfer was known for his romantic productions, in which the landscape was of chief importance. The chief painter at Strassburg was Hans Baldung Grün (c.1476–1545), whose works show the influence of Schongauer and Dürer. The so-called Saxon school was founded by Lucas Cranach (1472–1553), a Franconian master, whose work, though typical and interesting, is curiously archaic in execution.

France. Here the Flemish influence predominated for the most part during the fifteenth century, though finally yielding early in the sixteenth to the Italian. In France pictorial art found more expression in miniatures (see Illuminated Manuscripts) than in panel painting. The art resembled the Flemish, except that the advance to realism was slower and less marked. The chief master was Jean Fouquet of Tours, a portrait painter and illuminator, who practiced a detailed and exact art, like the Flemish, but with softer color, individual French characteristics, and some Italian influence. During the sixteenth century Flemish art, as well as Italian, found patronage at the court of Francis I. Jehan Clouet (died 1541?) and his son François (died 1572), court painters to Francis I, were thorough Flemings. But the King's chief importations were Italians, and the extensive decorations of Il Rosso, Primaticcio, and others at Fontainebleau gave the tone to French art of the century. The principal native artist was Jean Cousin (died 1589), a man of great talent and versatility, whose surviving works show both native and Italian influence.

Spain and Portugal. In these countries paintings were imported during the fifteenth century from the Netherlands and from Italy. Jan van Eyck himself visited Spain and Portugal, and some of the best works of Petrus Cristus and Rogier van der Weyden went there. In Aragon Florentine influence was predominant, but in Castile, where artistic production was greater, there was more Flemish, while Seville shows an amalgamation of both. The most famous artist of the fifteenth century was Antonio del Rincón (1446–1500), court painter to Ferdinand and Isabella. He is said to have abandoned Flemish art for Florentine, as did also Alejo Fernández at Seville. Another important name is Juan de Borgoña (1495–1533), who labored chiefly at Avila and Toledo. Notwithstanding foreign influence the Spanish painters of the early Renaissance display a distinct national tendency, chiefly evident in a general brownish tone and in the landscapes. In Portugal Flemish influence prevailed until late in the sixteenth century, when it was replaced by the Italian, and in Spain it disappeared, except in portraiture, both Alonzo Sanchez Coello (died 1590) and his pupil Pantoja de la Cruz (died 1609) preserving the manner of Antonis Mor. During the sixteenth century mannered Italian style was introduced, as exemplified in Berruguete (died 1561), Becerra (died 1570), and Morales (died 1586), of the Castilian school, and in Vergas (died 1568) and Vicente Juanes (died 1579), founders respectively of the schools of Andalusia and Valencia. Towards the end of the century the influence of the Venetian colorists, combined with some originality, appears in the works of Navarete (died 1579), called El Mundo, and especially in those of Theotocopuli, called El Greco (died 1625), an artist of amazing originality, thoroughly Spanish in his art and highly modern in method. The same tendency may be seen in the works of Roelas (died 1625), the chief master of the early Andalusian school, in whose works the national Spanish characteristics first appear. At Valencia Francisco de Ribalta (died 1628), reputed a pupil of the Carracci, and certainly trained in Italy, foreshadows the coming naturalism. The difference between the Spanish schools is geographical rather than artistic.

SEVENTEENTH CENTURY

From a technical standpoint the seventeenth century is the golden age of painting. Complete technical mastery had indeed been achieved by a few great masters during the Renaissance, but the seventeenth century made advances in the treatment of atmosphere and of light and shade. It saw a broadening of the sphere far beyond the bounds of the old monumental figure painting—an unprecedented development of landscape, genre, and portrait painting. Although this was the age of Eclectics as well as Naturalists, it was preëminently a realistic period. It developed easel painting rather than great decorative pieces. Italy was no longer the seat of the highest artistic development, the sceptre passing especially to Spain and the Netherlands, where great naturalistic schools developed.

Italy. Towards the end of the sixteenth century the reaction against mannerism became manifest in two widely divergent schools, the eclectic and the naturalistic. While not neglecting the study of the antique and of nature, the Eclectics sought to combine the excellence of all schools—Michelangelo's line, Titian's color, Correggio's light and shade, Raphael's grace. The pioneers of the movement were the three Carracci brothers, who about 1580 founded the first art academy, in the modern sense, at Bologna. (See BOLOGNESE SCHOOL OF PAINTING; CARRACCI.) They produced an art admirable in technical qualities but lacking in originality and genius. Of their pupils Domenichino (1581–1641) was the strongest and most conscientious; Guido Reni (1575–1642) the most gifted, but inclined to sentimentality. There were less important schools at Milan, Cremona, Ferrara, and at Rome, where flourished Carlo Maratta (1625–1713). The Florentine school maintained a semi-independent position, deriving inspiration from Andrea del Sarto.

Contemporary with the Eclectics flourished the rival school of the Naturalists, who, rejecting the standard of the great masters, found their model in nature. Their version of nature was an extravagant one, delighting in ugly types and in scenes of passion and bloodshed. Their chief technical characteristics are the use of dark shadow masses, whence the name the Darklings (Tenebrosi), and strong light effects; their line was coarse and strong and their brushwork harsh. Caravaggio (1569–1609), the founder of the school, active chiefly at Rome, is its most important representative. He painted figures of the street as saints and angels and genre pictures of much dramatic power. His followers, Valentin and Ribera, transplanted the style to France and Spain. At Naples, the chief seat of the school in Italy, flourished also Salvator Rosa (1615–73), a remarkably versatile painter of romantic genre in wild gloomy landscape.

France. Throughout the seventeenth century the influence of the old Italian masters prevailed in France. The Realists, like Valentin and the three brothers Le Nain, were in the minority. Men like Fréminet (died 1619) and Vouet (died 1649) were Mannerists after Italian models. The most important French painter of the century is Nicolas Poussin (1593–1665), the founder of the classic element in French art, whose works represent a purer classical sentiment than mannerism. He was practically the founder of the so-called heroic landscape (q.v.), which was further developed by Gaspard Poussin (1613–75) and to its highest extent by Claude Lorrain (1600–82). Beautiful and rich in color and pervaded by a golden or silver haze, his landscapes are full of profound poetic feeling. The establishment of the French Academy at Rome strengthened the connection of French and Italian art. Charles Lebrun (1619–90), who dominated the art of the reign of Louis XIV, painted enormous canvases of classical subjects glorifying the King, works of some decorative merit and original in composition, but poor in other respects. Of about the same merit were the religious paintings of Lesueur (1616–55), an imitator of Raphael. Sébastien Bourbon (1616–71) was more of a colorist, as was also Pierre Mignard (died 1695), who succeeded Lebrun. The portraitists of the epoch, of whom the chief representative is Philippe de Champagne (1602–74), are more virile and pleasing.

Spain. The seventeenth century was the golden age of Spanish painting. An art distinctly national in character arose, chiefly in the service of the Church and devoted to religious subjects and portraits. Its principal technical characteristics were emphasis of light and shade and a broad execution. At Seville, the centre of the Andalusian school, Herrera the Elder (1576–1656) was the first to discard entirely Italian mannerism and adopt the uncompromising naturalism which culminated in the art of his pupil Velazquez. Jusepe Ribera (1588–1656), although by training an Italian naturalist, and practicing chiefly at Naples, was essentially Spanish in subject, character, and coloristic ability. The religious side of Spanish art culminated in the simple and austere painting of Zurbaran (1598–1662) at Seville. Here Alonzo Cano (1601–67) represented an eclectic tendency. Portraiture reached its greatest height in Velazquez (1599–1660), who was not only the chief master of the Spanish school, but who attained supreme technical perfection. He painted his figures in full atmosphere without artifice in light and shade, frankly naturalistic, but individual and characteristic. The color values and the relation of light and shadow are perfectly rendered; the brushwork is sure and without effort. His pupils, Mazo (died 1667), Carreño de Miranda (died 1685), and others, continued his manner, and the last important painter of the Castilian school was Claudio Coello (died 1693), whose style was founded upon Titian and Rubens. The chief master of the Andalusian school was Murillo (1618–82), in whose works the Spanish characteristics, realism and religious ecstasy, are gracefully blended with charming color effects.

Flanders. The Hundred Years' War between Spain and the Netherlands (1568–1648) resulted in the division of the latter country into Flanders and Holland. The art of the former is aristocratic and Catholic, serving mainly the rulers and the Church. Flemish painting is characterized by the union of a strong native realism with bright Italian color. Peter Paul Rubens (1577–1640), head of the Antwerp school, entirely dominated the painting of his epoch. His virile and robust art shows a consummate mastery of technical means. His chief pupil was Van Dyck (1599–1641), celebrated for refined aristocratic portraits. Jordaens (1593–1678), coarser and more Flemish than Rubens himself, was rather his follower. Other followers were the portrait painter Cornelius de Vos and Snyders (died 1657) and Fyt (died 1661), painters of game, still life, fruits, and flowers. At the same time there flourished a school of genre painting distinctly Flemish in character. The chief representatives are Teniers the Younger (1610–90), Gonzales Coques (1618–84), and, best of all, Adriaen Brouwer, whose art is Dutch rather than Flemish.

Holland. Dutch painting differed from that of other countries in that it was bourgeois instead of aristocratic. Its prime object was the decoration of the home, and it consequently produced chiefly the small panel pictures. Beginning with portraits, Dutch painting developed in every direction—genre, landscape, cattle, still life—all within a single century, the seventeenth. Among the earliest portraitists were Mierevelt (1567–1641), Ravesteyn (died 1657), and Keyser (died 1667), but the chief master of the Haarlem school was Frans Hals (c.1584–1666), one of the greatest portraitists of all times. An astonishing realist of delightful humor, he painted his pictures in full light, and excelled in all pictorial qualities, his strength being only equaled by his facility. The greatest of Dutch artists was Rembrandt (1606–69), of the Amsterdam school, the supreme master of light and shade. In the use of high lights, in luminosity and transparency of shadows, and in harmony of warm, rich color, he has never been surpassed. Notwithstanding his realism, his highly subjective art is imbued with profound poetic feeling. His chief pupils were Bol, Flinck, and Eeckhout. Of quite a different character was Van der Helst (died 1670), whose well-modeled heads were more precise and detailed. The genre painters offer an inimitable picture of Dutch life. One class devoted itself to peasant scenes, especially in the tavern, coarse in subject but highly picturesque in character and fine in color; the chief representatives were Adriaen and Isaac van Ostade, and Jan Steen, who, however, depicted scenes from every phase of life. Another class, devoting itself to the middle and upper classes of society, produced mostly painted interiors with the greatest detail, but with real pictorial effect. The most important were Gerard Dou, Gerard Terburg, Gabriel Metsu, Pieter de Hoogh, and Jan Vermeer van Delft.

The Dutch landscape differs from the classic in its realism (see LANDSCAPE), its subject being generally Dutch, and in the substitution of beauty of tone for that of color, which is subordinated to a prevailing brown scheme. Following earlier landscapists like Van Goyen (died 1656) and Salomon van Ruysdael (died 1670), the school culminated in Jacob van Ruysdael (c.1265–82) and Meindert Hobbema (c. 1638–1709). The former's art was of a gloomy and tragic character, and he is considered the greater painter because of his superior versatility; the latter depicted sunnier and more friendly scenes. Some of the Dutch landscapists made extensive travels in search of subjects: Allart van Everdingen (died 1675) visited Norway, while Berchem, Dujardin, and Pynacker produced classic Italian pieces. Among cattle painters, with whom, however, the landscape is of equal importance, were Paul Potter (1625–54), a harsh realist, Adriaen van de Velde (died 1672), and Albert Cuyp (1620–91), whose color was bright and golden. Of marine painters the most important were Backhuysen (died 1709), who portrayed the tempest, and Willem van de Velde the Younger (died 1707), who preferred the smooth haven with ships riding at anchor. The work of the numerous still-life painters is characterized by emphasis of detail. Among these the principal painters of flowers were Jan de Heem, Van Huysum, and Rachel Ruysch; of dead game, Weenix and Van Aelst; of fish, Van Beyeren; of poultry, Hondecoeter; of pots, pans, dishes, and vegetables, Kalf.

EIGHTEENTH CENTURY

The eighteenth century is the transition from the aristocratic art of the seventeenth to the more democratic art of the nineteenth. On the one hand it witnessed, especially in France, an after development in the rococo; on the other it saw in England the rise of what may be called an art of the middle classes, which came to prevail universally in the nineteenth century.

With the regency and the reign of Louis XV painting in France assumed the frivolous character of the changed court life, producing admirable decorative pieces for boudoir and hall, charming in color and light in touch. The most important master of the early rococo was Watteau (1684–1721), who depicted delicate and skillful genre pieces of fashionable life. His best pupils were Lancret and Pater, and among the portraitists were Vanloo and Rigaud. The facile and able Boucher depicted every phase of rococo life, while Fragonard's (1732–1806) art is the culmination of its gayety, frivolity, and charm. Contemporary with the court painters were others who painted genre scenes from the life of the middle classes, like Chardin, a good colorist and an able realist, and Greuze, well known through his moralizing subjects and heads of young girls. The rococo was the golden age of the pastel (q.v.), in which the portraitist Quentin La Tour was the supreme master.

In Italy the only real artistic activity was at Venice. Here the most important genre painters were Piazzetta and Longhi; the best portraitist Rosalba Carriera, famed for miniatures and pastels; Canaletto and Guardi painted Venetian landscapes with fine color and tonal effects; and Tiepolo (1679–1770) was one of the world's greatest decorators, with an art recalling Veronese. He painted in light, flaky colors frescoes dashing in style and picturesque in realism. In Spain the dearth of talent was broken by Goya (1746–1828), an intense realist of grotesque imagination, who handled his brush with almost the ease of Velazquez and treated light and shade in a peculiarly individual manner.

England. A prelude to modern painting took place in England during the eighteenth century. Up to this time the demand for artists had been supplied by importations, chief among whom were Holbein, Van Dyck, Lely, and Kneller. The first native painter of note was William Hogarth (1697–1764), a coarse realist of original technique, who used art as a vehicle for inculcating moral ideas. He was, however, less influential than Sir Joshua Reynolds (1723–92), the founder of the academic element in English painting. His art was eclectic, but his portraits are dignified realistic presentations. Far more original was Gainsborough (1727–88), who went directly to nature for inspiration and whose highly poetic temperament is as evident in his portraiture as in his landscapes, in which he is an innovator. The art of Romney (1734–1802), though variable, is at best brilliant and attractive. Raeburn (died 1823), the principal Scottish painter of the epoch, unites in his best portraits bold brushwork with refreshing naturalism. The vivacious and clever Lawrence (died 1830) was at best a very able craftsman. The chief historical painter was Benjamin West, an American, whose eclectic art was acquired in Italy. In landscape Richard Wilson (1713–82) continued the classic manner of Claude, while in Morland (1763–1804) England produced an able painter of genre and animal subjects. At the same time a school of water colorists, founded by Cozens (1752–99) and Girtin (1775–1802), introduced brightness of tone and plein-air methods, preparing the way for the modern landscape. This medium, further developed by Thomas Stothard (1755–1834) and Turner, has always been one of the strong points of the English school.

MODERN PAINTING

France. Owing to the intelligent patronage of the state, as well as to the artistic character of the people, the hegemony in the fine arts in the nineteenth century, especially in painting, belonged to France. Here the epoch-making movements in its development originated and the chief representatives appeared.

The first great factor in modern painting was the classical reaction upon the rococo art of the ancien régime, corresponding with the French Revolution in politics. Neglecting the essentially pictorial attributes, it sought the chief beauty of art in form, as shown in ancient sculpture, and preferred to depict classic subjects. The leader was David (1748–1825), dictator of art under the Republic and the first Empire, where his teachings prevailed for half a century. His style was continued by many pupils, among whom were Girodet, Guérin, Regnault, and Vincent. The best painter of the epoch was Prud'hon (1758–1823), whose highly poetic art was influenced by Leonardo and Correggio. Baron Gros (1771–1835), in his Napoleonic battle pieces, led the way towards romanticism. Ingres (1780–1867) modified classicism by the study of Raphael and the great Italians.

Corresponding with the romantic revolt in literature was one against the prevailing classic traditions in painting, which began about 1830. Romanticism saw in the expression of the painter's emotional nature the highest beauty of art. Disregarding classical restraint in line and composition, it placed the chief emphasis upon color and natural truth. Géricault (1791–1824) made the beginning, but upon his early death the leadership passed to Delacroix (1799–1863). In warm prismatic colors and with regard for the general effect only, he depicted tragic subjects in a highly dramatic manner. His disciples include Gigoux, the younger Isabey, and others who painted historical subjects, like Devéria, Cogniet, Roqueplan, Robert Fleury. The Orientalists were romanticists who, following Delacroix's example, went to the Orient for subjects. Among the best known are Decamps (1803–60), Marilhat (1811–47), and Fromentin (1820–76). To the same group belong later the painters Théodore Frère and Ziem, the latter famous for Venetian scenes, and Regnault (1843–71), also a fine portraitist.

The Barbizon painters represented the emotional impulse of romanticism as applied realistically to landscape. Their cardinal principles and place in the development of landscape painting are described under Barbizon, The Painters of; Landscape. Théodore Rousseau (1812–67), who was the pioneer of the group and also its epic poet, depicted every phase of nature. Corot (1796–1875), "the poet's painter," was the lyric genius of the group, the painter of the silvery tones of morning and evening. Then there were Jules Dupré, a thoroughgoing romanticist, lover of the dramatic; Díaz, fantastic and joyful; and Daubigny, painter of orchards, vineyards, and river scenery. The most prominent animal painters in this group were Troyon (1810–65), a master of bright color who excelled equally in landscape, and Jacque, the sheep painter. Jean François Millet (1814–75), greatest of all peasant painters, depicted with primeval simplicity and great power of selection the dignity of the peasant's labor. Later painters, like Chintreuil, Français, and Harpignies, a realist, are classed with this group. So also are the heavier and more realistic animal painters, Van Marke, Auguste, and Rosa Bonheur.

Meanwhile the Eclectics had begun to unite classic line with romantic color. Under Louis Philippe, Delaroche (1797–1856) was a popular but weak painter of historical scenes, while Horace Vernet painted battles. More classic in character were Flandrin, "the religious painter of France," Gleyre, and the Neo-Greeks, like Hamon, Aubert, and Gérôme in the earlier part of his career. Under the Second Empire, Bougereau, Cabanel, and Lefèbvre continued eclecticism. Gérôme is a typical representative of the large group who combine academic training, romantic color, and realistic treatment. Laurens (1838–), Benjamin Constant (1845–1902), and Rochegrosse treat historical subjects. Couture (died 1879) and Henri Regnault (died 1871) are the last great romanticists. Baudry (1828–86), decorator of the New Opera, is a follower of the Italians of the sixteenth century. Puvis de Chavannes (1824–98), greatest of modern mural painters, returned to the flat decorative surfaces of Giotto and the ancients. His fine idealism, as that of Gustave Moreau (1826–98), is a reaction against the materialism of the nineteenth century.

The third great factor in French art is realism, as established in the forties by Gustave Courbet (1819–77). He advocated the abolition of academic law and of sentiment, and the portrayal of nature just as it is, and he practiced these theories in his strong materialistic painting. He had no direct pupils, but his influence has permeated French painting. Thus, the great portrait painters Bonnat and Carolus-Duran were Realists. The painters of military subjects also show realistic influence, especially Meissonier (1815–91), whose art was influenced as well by seventeenth-century Dutch. Among his followers in fashionable genre Vibert is the best known; among the military painters are De Neuville and Detaille. The genre scenes of Ribot and Roybet are of a different kind and more artistic, while among still-life painters Vollon (1833–1905) is unsurpassed.

The fourth great factor in the art of the late nineteenth and early twentieth centuries is impressionism, the advocates of which organized in 1874. Their progress consists in the abolition of the traditions of color and modeling, which the realists retained, and by rendering the impression they attained a better portrayal of life and motion. (See Impressionist Painting.) Manet (1833–83) was the founder of the school; the best-known landscapist is Claude Monet, the painter of pure daylight, and among its chief representatives are Sisley, Pissaro, the founder of pointillism (dotting with pure tints), and the figure painters Degas and Renoir (died 1898). Akin to their art is the work of Monticelli (died 1886). Their doctrine soon spread among other artists, winning such men as

Besnard, Carrière, and Raffaelli. Bastien-Lepage (died 1884) represents a compromise between realism and the new high-light painting, as do his followers, Renouf, Dagnan-Bouveret, and Fantin-Latour (died 1904). In late years an imaginative reaction against the materialistic side of impressionism, a new idealism, found expression, especially in such men as Henry Martin, Aman-Jean, Fournier, and the powerful Lhermitte.

Post-impressionism is the name generally accepted for such tendencies in painting as cubism and futurism. They represent in common a reaction against the painting of things and of light (realism and impressionism); rejecting nature as norm, they place the chief emphasis on subjective, individual impression. As their position in the history of painting is not yet established they are best treated in a separate article POST-IMPRESSIONISM. The movement was inaugurated in France by Cézanne, who seceded from the impressionists, and its other chief pioneers were Gauguin and Matisse.

Belgium and Holland. The development of painting in Belgium is closely connected with that of France. Navez (died 1869), a pupil of David, was the principal classicist; the chief leader of the romantic reaction was Wappers, who painted large historic canvases of national subjects and by the imitation of Rubens renewed the historic connection with the great age of Flemish painting. Wierz (died 1878) combined romanticism with weird eccentricity of moral import. Baron Leys, for his detailed historic paintings, reverted to the Dutch genre painters, to the Flemings of the fifteenth century, and especially to the Germans of the sixteenth. The impulse of realism is seen in works of De Groux and Dubois. Alfred Stevens, whose chief activity was in Paris, excelled especially in textures. Impressionism first found entrance in the works of Rops (died 1898) and Evenepoel (died 1900). An interesting group depicted with modern technique the life of the working classes—Frédéric, Meunier, known chiefly as a sculptor, and Laernans. Among very modern technicians are Smits, Rysselberghe, Ensor, Jeff Leempoels, while Khnopff is the foremost representative of the new mysticism.

In Holland the connection of nineteenth-century painting with that of the past is closer than in any other country. The most prominent figure is Josef Israels, who depicts the life of the Dutch peasantry and fisher folk with light effects and an intimate charm reminding one somewhat of Rembrandt. His tendencies were followed by Bisschop for the Friesian peasantry, Neuhuys for interior scenes, Artz for exterior. Equally reminiscent of the past are the landscape painters, chief among whom are Anton Mauve (died 1888), celebrated for his sheep and his landscape; Jacob (died 1898) and Willem Maris (died 1910), for cattle and landscape; Mesdag, a strong marine painter, and Bosbohm for church interiors. Only very recently has the impressionist influence entered into the landscapes of Breitner, Isaak Israels, and Tholen, and the portraits of Jan Veeth and Haverman. Jan Toorup is a weird symbolist from the Dutch East Indies, while Vincent van Gogh (died 1890) was one of the chief pioneers of post-impressionism (q.v.).

Spain and Italy. Spanish painting also has followed the French, though adding nationalist touches. The greatest influence of the century was wielded by Fortuny (1839–74), trained in the circle of Meissonier, but a far better colorist. He founded a school at Rome which was determinative also for Italian genre painting. Among his followers were Domingo, Zamacois, Madrazo (indirectly), and Rico, painter of Venetian scenery. The favorite subjects of Spanish academic painters have been vast gruesome canvases on subjects of national history. The two most important Spanish painters of the early twentieth century are Sorolla and Zuloaga, both Paris trained and impressionistic, the former a brilliant and wonderfully facile painter of pleasing outdoor effects, the latter more sombre and rich in color, but thoroughly national in spirit and subject.

Italy. The chief of the Italian classicists was Appiani (1754–1817). Both this group and the romanticists painted historical and religious subjects, but the favorite theme soon became a light genre. In this field the followers of Fortuny (Michetti, Favretto, and the realist Morelli) are of chief importance; De Nittis and Boldini, also a brilliant portraitist, are practically Parisian. But by far the most important figure of the nineteenth century is Segantini (1858–99), who in the spirit of Millet and with fine ideality painted the Alpine world and its inhabitants.

Germany. The earliest German classicists were Raphael Mengs (1728–79), who put into practice the theories of the great archæologist Winkelmann, and Carstens (1754–98), who followed them to their logical consequence, utterly neglecting color and inaugurating the cartoon style.

The reaction against classicism took the form of an imitation of Italian masters of the fifteenth century, inaugurated at Rome about 1815 by German painters, known as the Nazarenes, under the leadership of Overbeck (1789–1869). (See PRE-RAPHAELITES.) Cornelius (1783–1867) was head of the Munich school, and chief master of the cartoon style. (See CARTOON.) His chief follower, Wilhelm von Kaulbach (1805–74), used the cartoon style to express philosophic ideas. The Düsseldorf school, under the teaching of Schadow, paid more attention to color, and represented the romantic tendencies of German art. (See DÜSSELDORF SCHOOL OF PAINTING.) The greatest German mural painter of the period was Alfred Rethel (1816–59), of Düsseldorf; the principal romantic painter, Moritz von Schwind (1804–71), of Munich. Romantic landscape found its highest development in Karl Friedrich Lessing and his pupils, like the brothers Achenbach, while Friedrich Preller and Rottmann represented the classical tendencies.

The next important factor in German painting was the influence of French and Belgian colorists, and to the generation of the fifties Paris was the high school of art. The earliest artist to go there was Anselm Feuerbach, who refined the French influence by contact with the Italian. At Munich Piloty (1826–86) ingrafted French color on the cartoonist style. Among his numerous pupils were the Austrians Makart (1840–84), who was a better colorist, and Gabriel Max, painter of religious subjects. Meanwhile genre pictures, especially the works of Knaus, Vautier, Ramberg, Defregger, and Grützner, brought art back to real life.

The greatest change in German art, however, came after 1870, with the advent of realism. The dean of German realists, versatile in subject, an advanced colorist and painter of light effects, was Adolf von Menzel (1815–1905), of Berlin. In Munich there was a period of fruitful study of the old masters, the greatest product of which was the portraitist Franz von Lenbach (1836–1904), a brilliant colorist and delineator of character. Wilhelm Leibl, "the Courbet of Germany," painted powerful, realistic peasant types. In a class by himself stands the Swiss Arnold Böcklin (died 1901), brilliant in color, weird in imagination.

Since the early eighties impressionism has been a powerful factor in Germany, where the movement is known as the secession. Max Liebermann at Berlin (1849–) was the pioneer, and among other prominent representatives are Skarbina, a remarkable luminist; Frans Stuck, fond of gruesome, fantastic subjects; Max Klinger, possessor of amazing imagination and originality; Hans Thoma, a powerful realist; and Fritz von Uhde, a fervid painter of scriptural subjects in contemporary peasant costume. Those conservative in tendencies are Eduard von Gebhard, a strong religious painter; the younger Kaulbach, portrait painter of women; and Arthur Kampf, a realist. In late years the landscape has been transformed by the influence of the plein-air movement and impressionism. The two best-known groups are very modern in tendency and are located at Neu Dachau, a village near Munich, with Ludwig Dill, Höltzel, and Langhammer as chief representatives, and at Worpswede, near Bremen, with Hans am Ende, Moderson, Oberbeck, Mackensen, and Vogeler. The latest tendency is increasingly towards decoration, as may be seen in the recent works of Ludwig von Hofmann and of the Munich school among whom are Leo Putz and Fritz Erler. The chief centres are at Munich and Berlin, though others are also important.

Austria. Modern Austrian painting is best classed with the German school. It began practically in 1869, when Hans von Mackart, under state patronage, established himself at Vienna, where he long dominated artistic circles. Little of importance was done until the establishment in 1896 of the "secession," which brought new life into Austrian art. More than elsewhere decorative painting was developed under the leadership of Gustave Klimt, a man of very original talent. Among the principal landscape painters are Karl Moll and Max Kinzweil; the chief portraitist is Wilhelm Liszt. There is a Bohemian school of some importance at Prague, while in Hungary the principal master was long the religious painter Munkácsy.

Scandinavia. The painters of these lands were at first influenced by German romanticism and studied at Düsseldorf. Some, like Tidemand at Düsseldorf, Dahl at Dresden, and Gude at Karlsruhe, settled in Germany and became leaders there. Somewhat later they flocked to Munich and painted the large historical canvases then in vogue, like those of the Swede Helqvist. This tendency was finally followed in the eighties by the influence of Paris, resulting in the present brilliant development.

In Denmark the tendency was at first very national. Chief among the early men was Eckersberg (died 1853), a sincere naturalist. Carl Bloch (died 1890) in his historical paintings represents the Munich influence, while Johansen in his Flemish genre of the home side of Danish life is the chief exponent of its most characteristic feature. Kröyer is the pioneer of impressionism, while Swane and Weihe represent the most modern tendencies.

The art of Sweden is far more brilliant in technique, bright in color, and cosmopolitan in character. Since 1885 impressionist tendencies have prevailed, the best-known representatives being Anders Zorn, painter of the Danecarlian peasantry, Carl Larsson of bright home scenes, and Liljefors of wild animals. Among landscape painters are Prince Eugen, Danson, Nordström, Hesselbom, and Hallström; Kreuger is foremost as cattle painter and Richard Bergh as portraitist.

The spirit of Norwegian art is more rugged and melancholy. In Norway the pioneers of naturalism in the eighties were the "fighting brotherhood," Frits Thaulow, Christian Krogh, and Werenskiold, soon joined by Gerhard Munthe. This art culminated in Edward Munch (1864–), the greatest Norwegian painter of his time, influenced by Cézanne and very modern in his tendencies. The painting of Finland most resembles that of Sweden in its bright color effects and brilliant Parisian technique.

Russia. In Russia the early influences, which still linger, were Byzantine, although since the rococo period there has been more or less connection with west European art. In the last quarter of the nineteenth century an important modern school arose, chiefly under French influence but with strong national traits. The best-known Russian painter was Vereshchagin, whose powerful but theatrical art is devoted to the horrors of war. Of greater artistic importance are Repin for historical and Maliavine for figure subjects, Vazenov and Nesterov for religious subjects. The Russians have also developed a school of landscape painting of pleasing simplicity and fine feeling. In Poland there is a school extremely national in subjects, though not especially in technique, the chief representatives of which are Matejko and Siemiradzki.

Great Britain. Until well into the nineteenth century British art was little affected by that of the Continent. The tendency was towards the historical picture of an academic order, in which the chief representatives were Etty (died 1849), Haydon (died 1846), and Eastlake (died 1865), all mediocre painters. More important than these, though without color sense or technical training, was the imaginative genius William Blake (1757–1827). Britain is peculiarly the home of genre painting executed with much detail and illustrative ability, but showing little pictorial power. Representative are the Scotchman Wilkie (died 1841), Mulready, the Americans Leslie and Newton, and Frith. In landscape "Old Crome" (1769–1823), founder of the Norwich school, often showed Dutch influence. Turner (1775–1851) is the great representative of the heroic landscape, which he developed with modern methods and dazzling color effects. In England also the *paysage intime* (see LANDSCAPE) originated, chiefly through John Constable (1776–1837), who was the first to eliminate the brown tone in favor of nature's blues and greens. Cox was his chief pupil and Bonington the intermediary between his art and French.

The reaction against English academic tendencies came in 1848 through the Pre-Raphaelites (q.v.), among whom Rossetti was the best colorist, Holman Hunt the most detailed and laborious, Burne-Jones (died 1898) the most decorative, Millais (died 1896) the most inclined to realism. Their influence, which may be seen in the works of Walter Crane, G. F. Watts, "the painter of ideas," and others, leavened all English painting in the direction of ideality, but it also promoted a certain disregard of technique. Meanwhile the classical tendencies were represented by Lord Leighton (died 1896), Alma-Tadema, Poynter, and Val Prinsep, whose subjects are Greek and Roman, while Albert Moore and J. W. Waterhouse use classicism as a vehicle for pictorial or decorative motifs. The remaining development of English painting may be termed cosmopolitan. The chief influence, the French, began with the influence of the American Whistler, and was much promoted by the teachings of Legros in London. The Scottish school found its best early representatives in Lauder, Pettie, and especially in Orchardson. The most important branch is the Glasgow school, influenced especially by Whistler and a native impressionist MacTaggart, and including such able artists as James Guthrie, John Lavery, and Edward Hornell. The Newlyn school, of which the chief representative is Stanhope Forbes, paints the quiet scenery of the Cornish coast in broad brushwork and faithful light effects. A third group, which may be classed as the independent naturalists, includes the landscapists C. G. Lawson (died 1882), Alfred East, Mark Fisher, and the excellent marine painter Henry Holt, the animal painter Swan, the versatile figure and portrait painter Herkomer, and J. J. Shannon. One of the most important organizations representing modern, especially impressionist, tendencies is the so-called New English Art Club, including such markedly able men as P. W. Steer, William Orpen, and Augustus St. John.

United States. *Early Period.*—Until about 1825 American painting was marked by British influence. The portraitists in the Colonies during the eighteenth century were generally inferior British painters. The first American of importance was John Singleton Copley (1737–1815), who in an archaic but sincere style portrayed the stately New England society. Although Benjamin West (1738–1820) lived in London he was the most influential figure in early American art, because practically all young American painters studied under him. Of these C. W. Peale (1741–1827) established a school in Philadelphia; John Trumbull (1756–1843) was the painter of American Revolutionary subjects; and Gilbert Stuart (1755–1828) was by far the chief portraitist, excelling in characterization as in color and brushwork. Among West's younger pupils were Washington Allston, Robert Fulton, inventor of the steamboat, John Vanderlyn, and S. F. B. Morse, of telegraph fame. But, except Sully, neither they nor their younger contemporaries ever arose above mediocrity.

Middle Period (c.1825–c.1880).—The centre of art shifted from Philadelphia and Boston to New York, where the National Academy of Design was established in 1825. The British influence waned and a new school of more or less self-trained painters arose. It was most important in the landscape of the so-called Hudson River school (q.v.), founded by Asher B. Durand (1796–1886) and Thomas Cole (1801–48). The subject was generally mountain scenery, panoramic in character but painted with much detail and dry in color. Other important representatives were Kensett and F. E. Church, McEntee, Whitridge, Bradford, and Richards, a painter of marines. Connected with this school, at least in sentiment, was the work of Hubbard, Bierstadt, Moran, and others, who painted extensive panoramas of the Rocky Mountains. Portrait painting was represented by Harding, Elliott, Healey, and Huntington. Genre painting, which may be regarded as a British survival, was popular in the works of Mount, Eastman Johnson, J. G. Brown, Boughton, and E. L. Henry. All of this art was niggling in execution and deficient in color.

Meanwhile European influence began to make itself felt, that of Düsseldorf in Leutze (1816–68), the painter of Revolutionary subjects. More important was the French influence, introduced by Hicks (1823–90), a pupil of Couture, and especially by W. M. Hunt (1824–79), who introduced Barbizon methods, and John La Farge, America's foremost decorator. The early landscape found its culmination in the art of George Inness (died 1897), a painter of great versatility and poetic feeling who achieved fine tonal effects; Alexander Wyant (1836–92), characterized by refinement; and Homer D. Martin (1838–97), a painter of great power and lofty sentiment. All of them were influenced later in life by the Barbizon group. Of a different character was the powerful and realistic art of self-trained Winslow Homer, a painter of the sea and of the fisher folk. Here also belong George Fuller, whose style was indistinct and highly poetic, and Albert Ryder, a visionary painter of fine decorative effects.

Late Period.—After the Civil War, and particularly after the Centennial Exposition of 1876, which showed the superiority of the European schools, it became the general custom to study painting abroad, at Munich and especially at Paris. French methods were generally adopted, though the national spirit has shown itself in the choice of subject, in a certain refinement which sometimes becomes timidity, and in a sincere expression of feeling irrespective of technical methods. The new tendency was particularly represented by the Society of American Artists (q.v.), founded in New York in opposition to the conservative tendencies of the Academy. Among its early members trained at Munich were Frank Duveneck (1848–   ), influential as a teacher there and at Cincinnati; Walter Shirlaw; Frederick Dielman, long president of the National Academy; W. M. Chase, a brilliant technician and an influential teacher. The Paris contingent was represented by Sartain, Wyatt Eaton, the impressionistic James Alden Weir, and W. H. Low.

Many of the most influential painters remained abroad. In London Whistler (1834–1903) fought long for French methods and afterward exercised a wide influence on young Americans by his school in Paris. His art is realistic, impressionistic, and decorative in character. In London there settled also John Singer Sargent, a pupil of Carolus-Duran, best known as a powerful, realistic portraitist and also as a decorative painter. E. A. Abbey, the illustrator, was also a genre and decorative painter of great power. Among the Paris contingent are Ridgway Knight, Walter Gay, Alexander Harrison, Mary Cassatt, Gari Melchers, who painted Dutch scenes with powerful realism, and H. O. Tanner, the religious painter.

Among more recent landscape painters a few, like E. M. Taber and H. B. Jones, continued the detailed manner of the Hudson River school. The greater number, however, were followers of Inness or the Barbizon painters. The chief characteristics of their painting are tonal quality and emphasis on sentiment. Among the most important are C. M. Dewey, Ralph Blakelock, H. W. Ranger, H. G. Dearth, F. Ballard Williams, Carleton Wiggins (known as a cattle painter), Bunce, John Francis Murphy, Bruce Crane, Birge Harrison, Tryon, Ochtmann, Dougherty, Ben Foster, and W. L. Lathrop. The following may be classed as impressionistic: Theodore Robinson, Metcalf, Twachtman, and Childe Hassam. The principal painters of snow scenes are Schofield and Redfield; of the sea, Woodbury, C. T. Chapman, Waugh, and Emil Carlsen, known also for still life and landscape.

The favorite subject of figure painting has been the American girl, with the painters no less than with the illustrators. Of the Boston men Thayer depicts the spiritual, idealist type; Benson paints her in the sunlight; Tarbell in softly lighted interiors; Dewing in diminutive canvases with misty atmospheric effect; while Brush paints mother and child with Florentine sincerity and detail. Kenyon Cox represents learned academic tendencies in figure painting; Blum, subtle and delicate effects; H. O. Walker paints the Canadian habitant and his life; Frederic Remington, among others, chronicled Western frontier life.

Portraiture has become a less important branch of art. Among the foremost are Carroll Beckwith, Irving Wiles, J. W. Alexander, Decamp, Julian Story, Porter, Eakins, and Cecilia Beaux. Among the younger generation the most radical group, which paints all manner of subjects, is known for its bold and virile technique. The leader is Robert Henri, whose portraits are types, and among others are Jonas Lie, Glackens, Bellows, Luks, and Speicher. Many others of varied tendencies might be mentioned, like the landscape painters C. C. Cooper, John Sloan, and Dabo, and the figure painters Mora, Ballin, Gauley, Hawthorne, Miller, and Frieseke. A striking feature in the recent development of American painting has been the demand for mural decoration (q.v.).

After New York the chief centres of American painting are Boston and Philadelphia. In the Middle West the Society of Western Artists has held annual exhibitions since 1896. The chief centres are at Chicago, Cincinnati, St. Louis, and Indianapolis, and, on the Pacific coast, at San Francisco.

Canada. Until recently Canadian painting was mainly under British influence of a very conservative kind. Even after the foundation of the Royal Canadian Academy in 1880 the same tendencies prevailed. The best painters went abroad and became identified with other schools—Wyatt Eaton (died 1896) and Horatio Walker with the American, J. W. Morris and Paul Peel with the French. The national movement in Canada has made itself felt in art since about 1900, particularly in the selection of subjects, especially in landscape. In 1907 the Canadian Art Club was founded with a small but select membership not confined to Canada. Its members were trained principally in France and represent the more advanced tendencies. Among the foremost Canadian painters, besides those mentioned above, are Brymner, Homer Watson, Archibald Browne, Clarence Gagnon, William Hope, Curtis Williamson, Edmund Morris, and John Russell.

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PAINTING, Impressionist. See Impressionist Painting.

PAINTING, Miniature. See Miniature Painting.

PAINTINGS, Restoration of. See Restoration of Paintings.

PAINTS. Opaque mixed liquids capable of solidifying and used as protective or decorative coatings for various surfaces. The mixture consists of a pigment, which is a solid substance ground to a fine powder, mixed with a liquid of such a nature that when spread in a thin film and exposed to the air it will turn into an adhesive and more or less tough solid substance, thus cementing the particles of pigment to each other and to the coated surface. The pigments used in paint making are of various origins and compositions, but all, with the exception of white lead and zinc white, are of such a nature as to have little or no chemical action on the liquid component or vehicle. This liquid may be watery, like the solution of glue used in kalsomine, or an oil, like linseed oil; or it may be any kind of varnish. To the mixture of pigment and oil vehicle there is usually added a *drier* and a *solvent* or *thinner*.

Pigments. The only white pigments are white lead and zinc white, the former being a mixture of carbonate and hydroxide of lead and the latter an oxide of zinc. Both unite partially with the oil vehicle and form lead or zinc soaps which are very elastic and adhesive. Mixtures of white lead and zinc are now largely used in ready-prepared paints and give good results. Other white insoluble bodies such as *blanc fixe* (artificial sulphate of barium), whiting, infusorial earth, etc., have been used as pigments, but are now considered adulterants. Their legitimate use is confined to bases for lakes. The black pigments are lampblack, bone black, and graphite. Lampblack is mainly carbon and results from the imperfect combustion of oil or gas, the latter being also known as gas black and carbon black. Lampblack is the finest in texture of all pigments, but different lots vary greatly in this respect. The finer grades are the more valuable. It contains some peculiar oily matter and retards the drying of oil more than any other pigment, but it is, on the other hand, the most durable. The black pigment most commonly used (except in the special class of anticorrosive paints) is bone black, known also as drop black and in the finer grades as ivory black. This contains about 10 or 12 per cent of free carbon, to which it owes its color, the remainder being the mineral matter of the bone, 3 or 4 per cent of carbonate, and most of the rest phosphate of lime. Graphite, or mineral crystallized carbon, is extensively used in antirust paints; it is flaky in structure and brownish black in color; like all carbon pigments it is extremely opaque; it is difficult to grind it to a fine powder. For other mineral pigments, see Mineral Colors; Paint, Mineral.

Lakes. These are insoluble compounds prepared from artificial or natural dyestuffs by the agency of salts of aluminium, tin, lead, etc. A white or colored mineral pigment is used as a base on which the insoluble color compound is precipitated. Examples of such are carmine and madder lakes, artificial vermilion, azo red, etc. These lakes are commonly used to impart a desired tone to the more opaque pigments. Madder lakes are prepared from madder or alizarine, and may vary in shade from pink through red and yellow to purple and brown. See Lakes; Madder.

Vehicles. The principal oil used as a vehicle is linseed. This is made by expression from flaxseed; the crude oil is purified by settling, letting it stand two or three months in tanks at a temperature not lower than 70° F.; it is finally filtered. Linseed oil when spread in a thin film absorbs and combines with oxygen from the air and is converted into a somewhat elastic leathery substance, commonly known as linoxyn. By heating linseed oil in open kettles to 130° C., with a small amount of litharge, for several hours, the color darkens but the drying quality is increased; such a product is known as boiled oil. Poppy-seed oil is largely used with zinc white, as it does not have a tendency to yellow with age and exposure. Tung or wood oil, either Chinese or Japanese, is superior to linseed in drying quality, but it is not very extensively used on account of the tendency to dry flat. It is now largely employed in varnish making and is a favorite vehicle for the so-called enamel paints, which are essentially quick-drying varnishes mixed with pigments. Cottonseed and maize oils are frequently employed to adulterate linseed oil.

Driers. Driers act by taking oxygen from the air and giving it up to the oil. These driers are compounds of lead and manganese, in solution in the oil; these metals have the power of forming two sets of oxygenated compounds, the peroxidized ones having twice as much oxygen as the others. When in linseed oil they give up half their oxygen to the oil, then, being exposed to the air, they absorb a fresh equivalent of oxygen, which again the oil takes from them; in this way they act as carriers of oxygen from the air to the oil, acting only when the oil is spread out in a film and exposed to the air. Since the oil is thus converted into a solid dry substance, these agents are called driers.

Solvents. Most oil paints contain some turpentine or other volatile solvent. It is generally agreed that turpentine is the best of these; it is slow to evaporate, and any residue which does not volatilize readily oxidizes into a durable resinous substance, highly elastic, while benzine, which is often used as a substitute, is completely volatile. The turpentine mixture retains its fluidity some little time after brushing out into a film, and so the brush marks flow out and disappear and the whole surface becomes smooth and uniform; but benzine evaporates immediately, and the paint becomes comparatively stiff and shows brush marks and all imperfections of surface. This is still more marked in varnishes. Benzine has also a tendency, in some cases, to cause a separation. Kerosene is sometimes used as a substitute for turpentine, but good paint cannot be made with kerosene as an ingredient. Turpentine substitutes are usually composed of high-boiling-point benzine or low-boiling-point kerosene, scented with eucalyptus and other essential oils.

Fireproof Paints. Fireproof paints vary very much in composition, but usually contain asbestos, alkaline silicate, borax, fluorspar, ground glass, etc.

Bottom Paints for Ships. These compounds are designed to prevent corrosion and prevent or delay the growth of marine organisms. Two kinds of mixtures are used, one some form of good resistant varnish with or without metallic antiseptic pigment, usually a mercury or copper compound; the other antiseptic metallic soaps, such as mercury, copper, or arsenic, insoluble in water and applied hot. The best results are obtained by using both varieties, applying the soap last.

Water Paint, commonly known as kalsomine, consists of whiting or chalk suspended in weak glue water and applied warm. Coloring matter is usually added just before application. By adding plaster of Paris to the above mixture it is made more permanent. Special dry mixtures of whiting, plaster, glue or dextrin, and coloring matter are sold as cold-water paints. Whitewash or milk of lime is a highly sanitary and useful form of water paint. It may be tinted with any color not affected by lime, and is made more permanent and weather resisting by the addition of small quantities of casein, soap, water glass, etc. Common salt is used in these mixtures to increase the adhesive power.

China Paint. Colors for china painting are either resistant metallic bodies unaffected by the heat of the firing kiln or finely powdered colored glass, both suspended in turpentine.

Water Colors for artists are furnished either in dry cake or moist condition. In both cases they contain the finest and most expensive pigments ground in gum arabic or dextrin. For the moist forms a little glycerin is added.

Luminous Paint contains various phosphorescent sulphur compounds of barium, strontium, and calcium. See LUMINOUS PAINT.

Enamel Paints consist of high-grade oil varnishes containing pigment. The well-known China gloss is a mixture of zinc oxide in dammar varnish.

Damp-Resisting Paints are composed of some inexpensive and durable base, such as clay, marble dust, etc., suspended in asphaltum, gutta-percha, or petroleum residuum.

Gold and Bronze Paints contain finely divided metal powders suspended in lacquer, or celluloid dissolved in amyl acetate.

The value of paints exported from the United States in 1914 was $6,243,000 against $2,757,000 in 1904. See LAKES; LUMINOUS PAINT; MINERAL COLORS; OIL; PAINT, MINERAL; TURPENTINE.

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PAION'IOS. See PAEONIUS.

PAIRING. In parliamentary practice, an arrangement by which two members of a legislature who intend to cast opposite votes on a question agree that both will absent themselves for a limited time, thus leaving the relative strength of their parties unchanged. It has long been a recognized custom in the House of Commons. The first known instance in the United States Congress occurred in 1840. It was severely rebuked by John Quincy Adams, who prepared a resolution declaring that it involved the violation of the Constitution, of an express rule of the House, and of the duties of both parties. The resolution was never voted upon, and the practice, recommended by its obvious convenience, has since become common.

PAIS, pä'ēs, ETTORE (1856–). An Italian archæologist. He was born at Borgo San Dalmazzo, became director of the National Museum of Naples, and was elected a member of the

Royal Academy of Naples. Besides important papers in the *Rivista d' Italia*, *Atti delle Reale Accademia di Archeologia*, and *Rendiconti delle Reale Accademia di Lincei*, his publications include: *Storia di Roma* (1898); *Il riordinamento del museo nazionali di Napoli* (1902); *Perchè fui esonerato dalla direzione del museo nazionali di Napoli?* (1905); *Ancient Legends of Roman History* (1905), delivered for the most part as lectures in the United States in a Lowell Institute course, Boston, and at Columbia, Harvard, Wisconsin, and Chicago universities, and translated from the Italian by M. E. Cosenza; *Ricerche storiche e geografiche sull' Italia antica* (1908; Eng. trans. by C. D. Curtis as *Ancient Italy: Historical and Geographical Investigations*, 1908); *Storia critica di Roma durante i primi cinque secoli* (1913).

PAISH, pāsh, Sir George (1867–). An English economist. He became secretary to the editor of the London *Statist* while he was still in his teens, was subeditor from 1888 to 1894, assistant editor from 1894 to 1900, and joint editor until 1914. Paish was a governor of the London School of Economics and was knighted in 1912. In 1910 he was employed as an expert by the United States Monetary Commission, and in 1914–15 visited America to plan reforms in international finance called for by the war crisis. He published: *The British Railway Position* (1902); *Railways of Great Britain* (1904); *The Trade Balance of the United States* (1910); *Savings and the Social Welfare* (1911); *Railroads of the United States* (1913).

PAISIELLO, pä'ē-zyĕl'lō, or **PAESIELLO**, Giovanni (1741–1816). An Italian composer, son of a veterinary surgeon, born at Taranto, May 9, 1741. He received his musical education in the conservatory of St. Onofrio at Naples. Of his earlier operas produced at Naples the most celebrated was *Dal finto al vero*, composed in 1777. Some of his best works, particularly *Il barbiere di Seviglia*—later Rossini composed the same libretto—were written during an eight years' residence at St. Petersburg (1776–84). At Vienna he composed 12 symphonies for large orchestra and the opera buffa *Il re Teodoro*. Between 1785 and 1799 he produced a number of operas for the Neapolitan Theatre and was appointed by Ferdinand IV his *maestro di capella*. In consequence of having accepted under the revolutionary government the office of national director of music, he was suspended from his functions for two years after the restoration of royalty, but was eventually restored to them. In 1802 he went to Paris to direct the music of the consular chapel; but the indifferent reception shortly after given to his opera *Proserpine* led him to return to Naples, where he died, June 5, 1816. His compositions are characterized by sweetness and gracefulness of melody and a simplicity of structure remarkable for the period and conditions in which he lived. Besides more than 100 operas Paisiello composed masses, requiems, cantatas, an oratorio, instrumental quartets, harpsichord sonatas, and concertos. Consult C. G. Pupino, *Paisiello* (Naples, 1908).

PAISLEY, pāz'lĭ. A manufacturing town, municipal and parliamentary burgh of Renfrewshire, Scotland, on White Cart Water, 3 miles above its junction with the Clyde and 7 miles west-southwest of Glasgow (Map: Scotland, D 4). The town comprises the old portion on the west bank of the river, with long regular streets of warehouses and factories, and the new portion to the east built on level ground. It has fine municipal and ecclesiastical buildings, and the restored remnant of the abbey founded in 1164 is the best specimen of its kind in Scotland. The town has several parks and recreation grounds, including Dunn Square, the Fountain Gardens, the Brodie Park, and St. James Park, with a race course on which since 1608 horse races have been held annually on St. James's day. The town owns much real estate and gas, water, and electric-lighting works, controls the charities, manages the hospitals, and maintains public libraries and museums, baths, slaughterhouses, cemetery, and artisans' dwellings. Paisley, with the Coats and Clark factories, is the seat of the thread manufacture for the home and American markets. Tartan cloths, handkerchiefs, carpets, tapestry, embroidery, soap, starch, chemicals, machinery, bricks, pottery, and corn flour are largely manufactured; and large dyeing establishments, power-loom factories, print works, bleach fields, and shipbuilding yards operate in the town and vicinity. The manufacture, now almost extinct, of the famous Paisley shawls originated at the beginning of the nineteenth century. In early times the Roman Vanduara, the town is mentioned in 1157 as Passeleth, a possession of Walter Fitzalan, who six years later founded the priory. Pop., 1901, 79,350; 1911, 84,455. Consult Brown, *History of Paisley* (2 vols., Paisley, 1886).

PAISLEY TERRIER. See Terrier.

PAITA, pī'tȧ. A seaport of north Peru, situated at the head of a bay south of Cape Blanco (Map: Peru, A 5). The harbor is well sheltered and is one of the best on the Pacific coast. The town is uninteresting, but is of considerable commercial importance. It is connected by rail with Piura, the capital of the department, and another line is projected to join it with a port on the Maranon River. The exports, chiefly cotton, tobacco, Panama hats, hides, and salt, amounted to $5,881,382 in 1911. The imports for the same year were $1,393,200. The town has a United States consular agency. Pop. (est.), 5000.

PAIUTE. See Piute.

PÄIVÄRINTA, pă'ē-vă-rēn'tȧ, Pietari (1827–1913). A Finnish author. He was the son of small tenants, but by hard work gained a position of independence and of influence. For nine years he was a member of Parliament. In 1867 he wrote *Seurahunnan kosto*, describing war times under Charles XII. After 1877 he wrote so fully and sympathetically of the life of the Finnish peasants that his works became an invaluable source for the study of this folk. Under the title *Bilder ur Lifvet* some of his writings appeared in Swedish, and translations have been made also into German, Norwegian, Russian, and Flemish.

PAIXHANS, pĕk'säɴ', Henri Joseph (1783–1854). A French artillery officer, author, and inventor. He was born in France, graduated from the Ecole Polytechnique, and was assigned to the artillery, in which service he became a general officer. He invented the shell gun and the shells for use in it. The first guns made from his designs were completed about 1824. Previous to this explosive shells were used only in mortars, bombards, and similar short pieces designed for high-angle fire. General Paixhans declared that their use would force the armoring of ships' sides. In 1841 he presented plans to the French government for applying armor to vessels. Though his plans were rejected his work attracted attention throughout the naval world. In his *Nouvelle arme*, published in 1821, he pointed out the advantages of the largest practical calibres and the use of one calibre of guns in each ship. His ideas were at last realized, nearly a century later, in the all-big-gun ship of the present day. The original Paixhans gun had a calibre of 8.6 inches, was 9.3 feet long, and weighed about 7400 pounds. The charge was 10.5 to 18 pounds of powder; the shell weighed 60 pounds and the solid shot about 85 pounds. In addition to several works on naval ordnance and allied subjects he wrote many articles for periodicals and numerous important official reports and recommendations. See ARMOR PLATE; GUNS, NAVAL; ORDNANCE; SHIP, ARMORED.

PAJARITO, pä'ʜȧ-rē'tō. A fish. See HALFBEAK.

PAJOU, pȧ'zhōō', AUGUSTIN (1730–1809). A French sculptor. He was born in Paris, was a pupil of Lemoyne, obtained the first prize for sculpture in 1748, and went to Rome in 1752. On his return after four and a half years, he was elected a member of the Academy on the merit of his work "Pluto Holding Cerberus" (Louvre); in 1760 he became professor and in 1792 rector. Pajou received numerous commissions from Louis XVI and members of the court, among others the decorations of the façades of the Palais Royal and the Palais Bourbon; but his most remarkable work is the Opera House at Versailles, the finest example of sculptural decoration of the closing eighteenth century. He also modeled portraits of many celebrated men, including Pascal, Turenne, Bossuet, Buffon, and Descartes; but his genius is displayed to better advantage in his decorative statues, statuettes, and busts, charming examples of which are the busts of Madame Du Barry and the Count de Buffon and the statues of "Psyche" and a "Bacchante," all in the Louvre. His art is characterized by exquisite grace, suavity, and breadth, and resembles that of his contemporary, the painter Boucher. He received a handsome fortune from his works, but lost it by the Revolution. Consult his biographies by Lebreton (Paris, 1810) and Stein (ib., 1912).

PAKASKAS. See JAGGERY.

PAK'ENHAM, SIR EDWARD MICHAEL (1778–1815). An English soldier. He was born in County Westmeath, Ireland, entered the army at an early age, and by rapid promotion came to be major general in 1812. He served under his brother-in-law, Sir Arthur Wellesley (later the Duke of Wellington), in the Peninsula, particularly distinguishing himself at Salamanca, where he commanded the division which broke the enemy's centre and brought success to Wellesley. In 1814 he was selected to direct the expedition against New Orleans, and was killed in the unsuccessful attack of Jan. 8, 1815. See NEW ORLEANS, BATTLE OF.

PAKHOI, päk-hoi'. A treaty port of south China, in the Province of Kwangtung, situated on the Gulf of Tongking, 280 miles southwest of Canton (Map: China, J 7). The Chinese town is built at the foot of a bluff on the top of which lies the European section. The city serves as the port of Lienchow. The chief exports are hides, anise oil, indigo, and fish, and the imports cotton and woolen goods, petroleum, and opium. Pop., about 20,000. Pakhoi was opened to foreign trade in 1876. Imports in 1913 were 1,848,000 haikwan taels; exports 918,000. A railway is planned from Pakhoi to Nanning.

PAKHT, päkt. See Plate of EGYPTIAN DEITIES.

PAKINGTON, păk'ĭng-*ton*, JOHN SOMERSET. See HAMPTON, J. S. P., BARON.

PAKS, pŏksh. A market town and grand commune of Hungary, in the County of Tolna, situated in a marshy region on the Danube, 60 miles south of Budapest (Map: Austria-Hungary, F 3). The town produces textiles and starch and has a trade in grain, wine, and poultry. Pop., 1900, 12,034; 1910, 12,561, mostly Magyars.

PA-KWA, PA-KUA, pä'-kwä' (Chin., eight diagrams). Eight figures or symbols said to have been invented by the mythical Chinese Emperor Fu-hi (q.v.) and elaborated by Wŏn-wang. Confucius himself was much impressed with the system. Each consists of a group of three parallel horizontal lines, some of them whole and some broken in two, the broken lines symbolizing the *yin*, female or negative principle in the cosmogonic theory held by the Chinese, and the unbroken lines the *yang*, male or positive principle. By doubling these groups and ringing the changes on the different possible combinations a new series of 64 hexagrams was produced, and these form the basis of the oldest of the Chinese classics, the *Yi-King* (Book of Changes), where Wŏn-wang fully describes it. Consult Friedrich Hirth, *Ancient History of China* (New York, 1908). See CHINESE LANGUAGE, *Literature*.

PALACE. Originally a building for the residence of the sovereign, the term being derived from the buildings on the Palatine Hill at Rome, where the successive emperors built their residences and halls of state. Hence, by extension (*a*) the official residence of any high dignitary, as a prince or bishop; (*b*) any large and imposing official building, as Palace of Justice. (See PALAIS DE JUSTICE.) In a tropical sense an elaborate and splendid building for any purpose may be called a palace, but this is a departure from the strict meaning of the word.

The most celebrated palaces of the world exhibit the utmost efforts of architects and decorators to produce effects of surpassing magnificence, from the great terraced palaces of Assyria to the latest of the showy edifices on the Bosporus. The extravagant but early-demolished splendors of the golden House of Nero were rivaled by those of the caliphs of Bagdad and of the Mogul sultans of Agra and Delhi, which are still standing. Of more modern palaces the three of widest fame are the Vatican (q.v.) at Rome, the Louvre-Tuileries at Paris (see LOUVRE), and the magnificent palace built by Louis XIV at Versailles (q.v.), near Paris.

PALACE, COURT OF THE. An English court of limited civil jurisdiction, originally constituted by letters patent in the reign of James I. It exercised jurisdiction over all personal actions arising between parties within 12 miles of Whitehall, except in the jurisdiction of the Court of the Marshalsea, or of the City of London, or in Westminster Hall. The judges of the court were the Lord Steward, the Marshal of the Household, and the Steward of the Court. It served the metropolitan district, as the city was served by the Mayor's Court. As a result of abuses which developed in its procedure it was abolished by Act of Parliament in 1849 (12 and 13 Vict., c. 101) and its jurisdiction transferred to the county courts. Consult William Buckley, *The Jurisdiction and Practice of the Marshalsea and Palace Courts* (London, 1827).

PALACE, Master of the Sacred. See Magister Sacri Palatii.

PALACE, Mayor of the. See Major Domus.

PALACE OF THE LOUVRE. See Louvre, Palace of the.

PALACIO VALDÉS, pä-lä'thē-ō väl-dās', Armando (1853–). A Spanish novelist, born at Entralgo in Asturias. He passed much of his youth at Avilés, on the coast. After a preliminary training at Oviedo he went to Madrid to devote himself to the study of jurisprudence and political economy. He became a prominent member of the Ateneo and was made editor of the periodical *La Revista Europea* when but 22 years old. After directing it for three years he withdrew to give himself up to the composition of novels. The first of them, *El señorito Octavio* (1881), illustrates his fondness for simplicity of plot and marks him from the start as one who excels in the psychological analysis of the inner man as in the description of the aspects of outer nature. His second novel, *Marta y María* (1883), is by many deemed to be his masterpiece. It deals with the contrast between a life of active, human love and one of virginal and mystic contemplation. In his later novels Valdés inclines towards naturalism. The more recent works—all of great interest and most of them, like the *Marta y María*, now translated into English—are: *El idilio de un enfermo; José*, a charming seaside idyl; *Aguas fuertes*, a collection of tales; *Riverita* and its sequel, *Maximina*, the latter containing many autobiographical elements; *El cuarto poder; La hermana San Sulpicio; La espuma; La fe; El maestrante; El origen del pensamiento; Los majos de Cádiz; La alegría del capitán Ribot; Tristán, ó el pesimismo.* The author's ideas with regard to the art of fiction are expressed in essays prefixed to the editions of the *Hermana San Sulpicio* and the *Majos de Cádiz.* Other works of a critical nature are: *Los oradores del Ateneo; Los novelistas españoles, Nuevo viaje al Parnaso*, and, produced in collaboration with Alas, *La literatura en 1881.* Consult: Blanco-García, *La literatura española en el siglo XIX*, part ii (2d ed., Madrid, 1903); also W. D. Howells, in *Harper's Magazine* (New York, 1886); Baxter, "A Great Modern Spaniard," in the *Atlantic Monthly* (Boston, 1900); Davidson, in the introduction to his edition of the *José* (ib., 1900).

PALACKY, pä'läts-kē, Frantisek (1798–1876). A Bohemian historian and political leader. He was born at Hodoslavitz in Moravia and studied at Pressburg and Vienna. He became archivist at Prague in 1823 and national historiographer in 1839. In 1848 he was a prominent member of the Slavic Congress at Prague and shortly after acted as representative in the Austrian Diet at Kremsier. A leader of the Czech national party in the provincial Diet of Bohemia, he became a prominent figure in the political life of the Empire, allying himself (although a Protestant) with the Ultramontanes in his opposition to the Ausgleich with Hungary. His ideal was an autonomous Czech kingdom which should include Bohemia, Silesia, and Moravia. In 1861 he was made a life member of the Austrian Senate, but very seldom took part in the deliberations of that body. He took part in the Panslavic Congress at Moscow in 1867. Palacky's reputation as historian rests on his *Geschichte von Böhmen* (1836–67), begun in German and continued in Czech, a work based on vast original research into original sources. Other writings are: *Die ältesten Denkmäler der böhmischen Sprache* (1840); *Geschichte des Hussitentums* (1868); *Geschichte des Hussitenkriegs* (1872–74).

PALADILHE, pä'lä'dēl', Emile (1844–). A French composer, born near Montpellier. He studied at the Paris Conservatory under Benoist, Marmontel, and Halévy, and in 1860 won the Grand Prix de Rome with the cantata *Le czar Ivan IV.* In 1892 he succeeded Guiraud as member of the Académie des Beaux-Arts. His first opera, *Le passant*, was produced in 1872 and was followed by *L'Amour africain* (1875); *Suzanne* (1878); *Diana* (1885); *Les Saintes Maries de la mer* (1892), a lyric drama. His most successful opera, *Patrie*, produced in 1886, has been given in Germany and Italy. His compositions also include considerable sacred music.

PAL'ADIN (OF. *paladin*, from It. *paladino*, from ML. *palatinus*, warrior, one connected with the palace, from Lat. *palatium*, palace). A term which, originally derived from the counts palatine (see Palatine), was later used generally to designate a lord or chieftain, and by the Italian romantic poets for a knight-errant. The most widely known paladins are the legend-renowned companions of Charlemagne.

PALADINES, Louis Jean Baptiste de. See Aurelle de Paladines, L. J. B. d'.

PALA D' ORO, pä'lä dō'rō. The high altar and altarpiece in the church of St. Mark at Venice. It is of copper, silver, and gold, set with jewels, a superb example of Byzantine metal work. It was made in Constantinople, the older part in the tenth century, the later part in the twelfth. On account of its priceless value it is concealed under a metal grille except on church feast days.

PALÆARCTIC REGION. See Palearctic Region.

PA'LÆAS'TER (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *ἀστήρ*, *astēr*, star, starfish). An extinct genus of starfishes, found in rocks of Ordovician to Carboniferous age in North America and Europe. See Starfish.

PALÆ'MON, Quintus Remmius. A Roman grammarian of the first century. He was born at Vicentia, the son of a female slave. Unlike the earlier scholars, who had made the older literature the centre of their linguistic studies, Palæmon devoted himself chiefly to Vergil and introduced the latter's works as a textbook into the Roman schools. His grammar, *Ars*, is said to have been much consulted by later grammarians, but is now lost. It contained rules for correct speaking, with examples from the poets. The extant grammar that bears his name is wrongly ascribed to him. He is mentioned by Suetonius (*De Illustribus Grammaticis*, 23) and by Juvenal (vi, 451; vii, 215–219), who says that Palæmon was the master of Quintilian. Consult: Henry Nettleship, in the *Journal of Philology*, vol. xv (London, 1886); Marschall, *De Remmii Palæmonis Libris Grammaticis* (Leipzig, 1887); J. E. Sandys, *A History of*

Classical Scholarship, vol. i (2d ed., Cambridge, 1908).

PALÆMON. See Melicertes.

PALÆOBOTANY, etc. See Paleobotany, etc.

PA'LÆOCREU'SIA (Neo-Lat. nom. pl., from Gk. *παλαιός*, *palaios*, ancient + Neo-Lat. *Creusia*, from Gk. *Κρέουσα*, *Kreousa*, a character of Greek mythology). A Lower Devonian barnacle that lived as a commensal in cavities of the coral *Favosites*. See Barnacle.

PA'LÆOHATTE'RIA (Neo-Lat. nom. pl., from Gk. *παλαιός*, *palaios*, ancient + Neo-Lat. *Hatteria*, of uncertain origin). A fossil lizard-like reptile, found in the Permian formations of Europe. It was formerly supposed to be allied to Sphenodon (*Hatteria*), but now is known to be in many ways much more primitive. It is probably more closely related to the American Permian reptile *Varanosaurus*.

PA'LÆOL'OGUS (Lat., from Gk. *Παλαιόλογος*, *Palaiologos*). The name of an illustrious Byzantine family which first appears in history in the eleventh century and attained the Imperial dignity in the person of Michael VIII (q.v.), who became Emperor of Nicæa in 1260, and mounted the throne of Constantinople in 1261. His successor on the throne was his son Andronicus II, in whose reign, which extended from 1282 to 1328, the Turks commenced a series of assaults on the Byzantine dominions. He associated his son, Michael IX, with himself, but the latter died and Andronicus was dethroned by his grandson, Andronicus III, who reigned from 1328 to 1341. The latter was an able warrior and ruler, who repeatedly defeated the Bulgarians, the Tatars of the Golden Horde, and the Servians, but was unsuccessful against the Catalans in Greece, while the Turks during his reign ravaged the coasts of Thrace as far as the Balkans. He was greatly esteemed by his subjects, and well merited the title of father of his country. Andronicus III was succeeded by his son, John V, who ruled, with some interruptions, from 1341 to 1391. During his minority his mother, Anna, and John Cantacuzenus were regents. The latter in self-protection had himself proclaimed co-Emperor as John VI in 1341. (See Cantacuzenus.) During John V's reign the Turks made great progress, and the Emperor was compelled in 1370 to agree to pay them an annual tribute. In 1376 John was overthrown by his son, Andronicus IV, but regained the crown in 1379. In 1390 the son of Andronicus IV, John VII, dethroned him and ruled for a few months, but John V ultimately regained the crown and retained it until his death, Feb. 16, 1391. John VII sought Turkish aid and compelled the son and successor of John V, Manuel II (q.v.), to make him co-Emperor in 1398, but in 1402 he was sent to the island of Lemnos, and in 1407 some land was given to him in Thessaly and Macedonia which the Turks soon conquered. He died about 1408. The successor of Manuel II was his son, John VIII, who ruled from 1425 to 1448. On being pressed by the Turks he held out to the popes the old bait of the union of the Greek and Western churches under his sway, and even presented himself at the Council of Florence, where, in July, 1439, the union of the churches was brought about. But on his return to Constantinople the opposition of the Greek ecclesiastics to the union, supported by the people, rendered the agreement of Florence a dead letter. The Pope, however, stirred up Ladislas of Hungary and Poland to attack the Turks, but they could not be driven back. John was succeeded by his brother Constantine XI, who ruled from 1448 to 1453, and with him the Byzantine Empire ended. (See Constantine XI.) A branch of the Palæologi ruled Montferrat, in Italy, from about 1306, but became extinct in the sixteenth century. The Palæologi were connected by marriage with the ruling families of Hungary and Servia, and the niece of the last Byzantine Emperor married Ivan III, Czar of Russia—a fact which the Czars of Russia were wont to bring forward as an argument in favor of their claims to European Turkey. Consult Edward Gibbon, *Decline and Fall of the Roman Empire*, vols. v–vi, edited by J. B. Bury (New York, 1898–1900), and Edwin Pears, *The Destruction of the Greek Empire* (ib., 1903).

PA'LÆOMAS'TODON. The earliest known certain members of the family Elephantidæ, found in the Lower Oligocene of the Fayum, Egypt. They varied in size from a tapir to a half-grown elephant. They were probably directly ancestral to the Lower Miocene mastodons of Europe. Exceedingly primitive in structure, it possessed a long, prehensile upper lip, a pair of spoon-shaped lower incisor teeth which opposed this lip, a pair of upper incisor tusks well developed as fighting weapons, with an enamel band on the outer sides.

PA'LÆONIS'CUS (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *ὀνίσκος*, *oniskos*, fish of the cod kind, dim. of *ὄνος*, *onos*, ass). A genus of fossil actinopterygian fishes found in the Permian rocks of Europe, North America, and South Africa. The body was long and slender, covered with regular ganoid scales, and was provided with small triangular dorsal, pectoral, pelvic, and anal fins. It is especially common in the shales of England and in the copper-bearing shales of Thuringia in Germany.

PA'LÆOSPON'DYLUS (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *σπόνδυλος*, *spondylos*, *σφόνδυλος*, *sphondylos*, vertebra). A very interesting fishlike fossil found in the flagstones of the Old Red Sandstone at Achanarras, near Thurso, Scotland. The entire fossil is scarcely 2 inches long, and it consists of an anterior broader cephalic portion and a long posterior slender vertebral column, terminated by a delicate feather-like fin. The structure of the head resembles that of the recent lamprey, and on this account *Palæospondylus* is supposed to be an ancestral lamprey, in which all the cartilages were calcified. Consult Dean, "The Devonian Lamprey, Palæospondylus gunni Traquir, with Notes on the Systematic Arrangement of the Fish-like Vertebrata," in *New York Academy of Sciences, Memoirs*, vol. ii, part i (New York, 1899). See Cyclostomi.

PA'LÆOTHE'RIUM (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *θηρίον*, *thērion*, dim. of *θήρ*, *thēr*, wild beast). An extinct perissodactylate hoofed mammal of the size of a rhinoceros, found in abundance in some Eocene deposits of Europe. It was described and named by Cuvier in 1804 from specimens exhumed at the gypsum quarries at Montmartre, near Paris. By some authors it has been looked upon as a three-toed ancestor of the horse, but it is more properly considered to represent a lateral offshoot from the main line of evolution of the horse. See Horse, Fossil.

PALÆ'PHATUS (Lat., from Gk. *Παλαίφατος*, *Palaiphatos*). A Greek mythographer, of an uncertain period, who is said to have written in several books an historical and allegorical explanation of Greek myths. Of this work there is extant only a short abstract, *On Incredible Tales* (Περὶ Ἀπίστων), which was formerly a favorite schoolbook. In it Palæphatus gives a brief account of about 50 of the most celebrated Greek legends and explains them according to the method of Euhemerus. The treatise has been edited by Westermann, in his Μυθογράφοι (Brunswick, 1843), and by N. Festa, *Mythographi Græci*, vol. iii, fasc. ii (Leipzig, 1902). Consult Friedrich Wipprecht, *Questiones Palæphateæ* (Leipzig, 1892), and the prolegomena to Festa's edition.

PALAFOX Y MELZI, pä'lȧ-fōʜ' ē mål'thē, José de, Duke of Saragossa (1780–1847). A Spanish patriot and soldier. He entered the army in 1792 and was lieutenant in 1808. Upon the invasion of the French he carried on a fierce guerrilla warfare against them, was made captain general of Aragon, unsuccessfully attempted to hold the line of the Ebro, and distinguished himself by his heroic defense of Saragossa, July 27–Aug. 14, 1808, and Dec. 20, 1808–Feb. 21, 1809. He was taken a prisoner to France and kept at Vincennes until the restoration of Ferdinand VII in 1814, when he was made captain general of Aragon. He commanded the National Guard from 1820 to 1823, and afterward lived in disgrace till 1836, when he became Duke of Saragossa and grandee of Spain.

PALAIHNIHAN, pȧ-lī'nē-ȧn (Klamath *p'laikni*, mountaineers). A name formerly given to the Pit River (q.v.) Indians, who were supposed to constitute a separate linguistic family, but shown by Dixon to be of Shastan stock (q.v). Consult R. B. Dixon, in *American Anthropologist*, n. s., vol. vii (Lancaster, Pa., 1905).

PALAIS BOURBON, pȧ'lā' bōōr'bôɴ'. See Chambre des Députés.

PALAIS DE JUSTICE, pȧ'lā' de zhụs'tēs'. A French tẹrm designating a courthouse. With the progressive strengthening and consolidation of the royal power in France in the fifteenth century the royal courts took on increasing importance, and special buildings were erected in a number of cities to house them. Of these the most splendid was the Palais de Justice of Rouen, erected in 1493–99 in that most brilliant phase of the Gothic Flamboyant style in which it finally expired at Rouen. The most important edifice known by this name is, however, that at Paris on the Île de la Cité, occupying the site of the old royal palace, which was presented to the Parlement partly by Louis IX, about 1260, partly by Charles VII in 1431. Of this the only portions spared by the fires of 1618 and 1776 are the Tour de l'Horloge, containing the oldest public clock in France, dating from 1370, the famous Sainte-Chapelle (q.v.), the Conciergerie (q.v.), the so-called Kitchens of St. Louis, and three towers. The building was modernized under Louis XIII, when the great Salle des Pas-Perdus was erected. During the war of the Commune in 1871 a large part of the structure was destroyed, but has been restored. A number of the courts open into the Salle des Pas-Perdus, one of the largest halls in existence, 240 feet long, 90 feet wide, and 33 feet high, consisting of two galleries separated by arcades. It contains several monuments and statues. The buildings have been greatly added to since 1871. The chief entrance of the Palais de Justice is formed by the handsome Court of Honor, adorned with allegorical statues. Several Belgian towns also possess late Gothic Palaces of Justice (e.g., Liége); the Palais de Justice of Brussels, by Polaert, a modern building, is of vast dimensions and almost overpowering massiveness.

PALAIS DE L'ÉLYSÉE. See Elysée, Palais de l'.

PALAIS ROYAL, pȧ'lā' rwȧ'yȧl' (Fr., royal palace). The name of a block of buildings on the east side of the Rue Richelieu in Paris, composed of a palace, theatres, a public garden, shops, cafés, and restaurants. The palace, called at first the Palais Cardinal, was built by J. Lemercier between 1629 and 1636 on the site of the Hôtel Rambouillet for Cardinal Richelieu, who at his death bequeathed it to Louis XIII. It subsequently became the residence of the Orléans branch of the Bourbons, and during the minority of Louis XV acquired a scandalous notoriety as the scene of the wild orgies in which the Regent, Orléans, and his dissolute companions were wont to indulge. In the time of his great-grandson, Philippe Egalité, it became the focus of revolutionary intrigue. This Prince, partly to repair his impoverished fortune and partly to prove the sincerity of his professed sympathy with the people of Paris, converted the garden of the Palais Royal into a place of public resort and surrounded it with a continuous range of buildings provided with shops and stalls (1763). On the downfall of Egalité the building was taken possession of by the Republican government. On the restoration of the Bourbons it was occupied by Louis Philippe till his coronation in 1830, when it became the property of the state. The palace was sacked by the mob during the revolution of 1848, when many of its works of art were destroyed. It was thoroughly repaired and magnificently furnished in 1855 and given by Napoleon III to his uncle, Jerome Bonaparte, whose son, Prince Napoleon, resided there until 1871. The Communists set fire to the palace in 1871, but the flames were checked before they spread to the galleries and shops, and the injured portions were restored in the autumn of 1873. The southwest corner of the block is occupied by the Théâtre Français (q.v.), the northwest corner by the Théâtre du Palais Royal. The garden long constituted one of the liveliest and most frequented spots in the whole city; but the cafés and restaurants once surrounding it have almost wholly disappeared.

PALAME'DES (Lat., from Gk. Παλαμήδης). In Greek mythology, a hero, son of Nauplius and Clymene. In Homer he is not mentioned, but in the later literature on the Trojan War he plays a prominent part, being especially noted for his quick understanding and resourcefulness. His wit detected the simulated madness of Odysseus by placing the infant Telemachus in front of his father's plow. To him also was ascribed the invention of letters, numbers, weights and measures, money, dice, and drafts.. This last, we are told, was to divert the army in a time of scarcity. His death was attributed to the jealousy of Odysseus and Diomedes, or the revenge of Odysseus, but the stories as to the plot which caused his death and its execution varied widely. (See, e.g., Vergil, *Æneid*, ii, 82, and Ovid, *Metamorphoses*, xiii, 86.) The name Palamidi, which is now borne by the rocky height above the modern

Nauplia, is commonly believed to point to a cult of the hero in the neighborhood. Consult Jahn, *Palamedes* (Hamburg, 1836), and the article "Palamedes," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (Leipzig, 1897–1909).

PALAMEDESZ, pä'lȧ-mä'dĕs, ANTONIS (c.1601–73), surnamed STEVAERTS. A Dutch genre and portrait painter, born at Delft. His father, a gem setter and painter, was in the service of James I of England. The younger Palamedesz, who was influenced by Dirk and Frans Hals and by Mierevelt, entered the guild of Delft in 1621 and was its president repeatedly. His subjects are portraits, conversation pieces, or military scenes, treated with vivacity and simplicity and without the coarseness usual to his contemporaries. His execution is careful, his color rich, his rendering of material excellent, and his portraits natural and dignified. Some of his finest works are in the galleries at Amsterdam, Rotterdam, Berlin, Munich, and Stockholm. He painted the figures in many of Van Delen's pictures, including "The Meeting of the States-General" (1651), in The Hague Museum. His brother, PALAMEDES PALAMEDESZ (1607–38), who was also his pupil, became well known as a battle painter. There is a spirited "Charge of Cavalry" in the Berlin Museum by him.

PAL'AMON AND ARCITE, är'sīt. Two Theban princes, imprisoned by Theseus, who both loved Emilia, sister to Hippolyta. Their story is told by Chaucer, in the "Knight's Tale," which was taken from Boccaccio's "Teseide." A French poem, "Palamon and Arcite," by Anna de Greville, appeared in 1487. The same story is used in Fletcher's tragedy *Two Noble Kinsmen*, printed in 1634, but probably written in 1616 and said to have been revised by Shakespeare. The tale is also used in Edwardes's play *Palamon and Arcite*, now lost, produced for Queen Elizabeth at Oxford, 1566. Another lost play of this title is mentioned in Henslowe's *Diary* as played in 1594. Dryden introduced a version of the story in his "Fables" in 1700.

PALANDER AF VEGA, pä-län'dĕr äv vā'gȧ, ADOLF ARNOLD LOUIS (1842–). A Swedish naval officer and Arctic navigator, born at Karlskrona. He was a member of Nordenskiöld's expedition to Spitzbergen in 1868 and again in 1872–73; later he served as navigator of the *Vega* of Nordenskiöld's expedition to discover the Northeast Passage (1878–80). Of the journey he gave an account in the press. (See POLAR RESEARCH.) The Riksdag voted Palander, as well as Nordenskiöld, an annual award, Oscar II made him his aid-de-camp, he was knighted, and in 1910 he became admiral. In 1901–05 he was Minister of State.

PALANPUR, or **PAHLANPUR**, pä'lȧn-pōōr'. A native state of Gujarat, India, feudatory to Bombay (Map: India, B 4). Area, 6393 square miles. The chief products are sugar cane and cereals. Pop., 1901, 467,271; 1911, 515,092. The capital, Palanpur, is a station of the Rajputana-Malwa line. Pop., 1901, 17,799; 1911, 17,221.

PALAPRAT, pȧ'lȧ'prȧ', JEAN, SIEUR DE BIGOT (1650–1721). A French dramatist, born at Toulouse. He became secretary to the Grand Prior of Vendôme (Loire-et-Cher). With David Augustin de Brueys he wrote a number of plays once esteemed for their wit. He himself was the sole author of a few, including *Les Quiproquo* and *Hercule et Omphale* (1694). All were collected in five volumes in 1735–55.

PAL'ATE (OF. *palat*, from Lat. *palatum*, *palatus*, palate, roof of the mouth). The palate forms the roof of the mouth and consists of two portions, the hard palate in front and the soft palate behind. The framework of the hard palate is formed by the palate process of the superior maxillary bone and by the horizontal process of the palate bone, and is bounded in front and at the sides by the alveolar arches and gums; posteriorly it is continuous with the soft palate. It is covered by a dense structure formed by the periosteum and mucous membrane of the mouth, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucous membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with squamous epithelium and is furnished with numerous follicles (the palatal glands). The soft palate is a movable fold of mucous membrane inclosing muscular fibres and suspended from the posterior border of the hard palate so as to form an incomplete septum between the mouth and the pharynx, its sides being blended with the pharynx, while its lower border is free. When occupying its usual position (i.e., when the muscular fibres contained in it are relaxed) its anterior surface is concave, and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense and the food is thus prevented from passing into the posterior nares and is at the same time directed obliquely backward and downward into the pharynx. Hanging from the middle of the soft palate's lower border is a small conical pendulous process, the *uvula*, and passing outward from the uvula on each side are two curved folds of mucous membrane containing muscular fibres and called the arches or pillars of the soft palate. The anterior pillar is continued downward to the side of the base of the tongue and is formed by the projection of the palatoglossus muscle. The posterior pillar is larger than the anterior and runs downward and backward to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the tonsil of either side is lodged. The tonsils (amygdalæ) are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an assemblage of mucous follicles intermingled with diffuse adenoid tissue and covered by a mucous membrane. The follicles secrete a thick, grayish matter and open on the surface of the gland by numerous (12 to 15) orifices.

The space left between the arches of the palate on the two sides is called the isthmus of the fauces. It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as harelip), so also may there be more or less decided fissure of the palate. In the slightest form of this deformity the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and the hard palate as far forward as the lips, and is then often combined with harelip. When the fissure is considerable it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up its articulation is painfully indistinct. On this account the tendency among modern surgeons is to close the fissure early in infancy. Closure of a cleft soft palate is called staphylorraphy; of the hard palate, uranoplasty.

Chronic enlargement of the tonsils is very frequent in children and the adolescent and is not seldom met with in adults. Its usual symptoms in children are muffled speech, obstruction in breathing, and a disposition to acute attacks of tonsillitis. Deafness occasionally is present both in children and adults from pressure of the enlarged tonsils upon the openings of the Eustachian tubes. Chronically hypertrophied tonsils should be removed, together with adenoid vegetation, which usually coexist. See ADENOID.

The uvula is subject to relaxation or elongation. The appendage is found to be more or less œdematous and hangs downward towards the larynx, where, by its irritation, it often gives rise to a constant tickling cough. The condition is usually relieved by astringent applications and gargles. Where these fail to relieve a portion of the uvula should be amputated.

PALATINATE (Fr. *palatinat*, from ML. *palatinus*, palatine, from Lat. *palatinus*, relating to a palace, or to the Palatine Hill, from *palatium*, palace, Palatine Hill). A feudal district whose ruler exercised nearly all the prerogatives of sovereignty. Under the Frankish Merovingian kings a *comes palatinus*, or count of the palace, was a high judicial officer residing at court. After the time of Charlemagne the office became localized and territorial and the *comes palatinus* ruled in almost complete independence over his own district, often near the frontier. As early as the eleventh century the Count Palatine (Pfalzgraf) of the Rhine appears among the hereditary princes of the German Empire. In the thirteenth century the term "palatinate" or "county palatine" was introduced into England from the Continent to designate a jurisdiction whose beginnings can in some instances be traced back to Anglo-Saxon times. There were three principal counties palatine in England—Chester (q.v.), Durham (q.v.), and Lancaster (q.v.)—whose origin and development were no doubt influenced by their proximity to the frontier. The counts or earls palatine ruled over entire counties, so that all the landowners held feudally of them; they received the whole profits of the courts and exercised all the regalia or royal rights, nominated the sheriffs, held their own councils, and acted as independent princes, except in the owing of homage and fealty to the King. Other counties palatine were formerly Kent, Shropshire, Pembrokeshire, the Isle of Ely, and Hexamshire, though the varying extent of their immunities makes it difficult in some cases to determine whether they were true palatinates. In very early times there were similar jurisdictions in Scotland, the most important of which was that of Strathearn. The Province of Maryland, in America, was granted to the Baltimores, on the model of the Palatinate of Durham. Consult William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897), and G. T. Lapsley, *The County Palatine of Durham: Study in Constitutional History* (New York, 1900).

PALATINATE, THE (Ger. *Pfalz*, palace). The name of two little countries in the old German Empire, the Upper Palatinate and the Lower or Rhenish Palatinate, which were politically connected till 1620. The Upper Palatinate is at present included within the Bavarian district of the Upper Palatinate (Oberpfalz) and Regensburg. The capital was Amberg. The Lower Palatinate (Unterpfalz) was composed of an irregular and disjointed territory on both sides of the Rhine, included roughly within the space marked off by the cities of Mainz, Worms, Heilbronn, Landau, and Zweibrücken. It included the Electoral Palatinate (with Heidelberg, and for a time Mannheim, as its capital), the Principality of Simmern, the Duchy of Zweibrücken (Deux Ponts), the principalities of Veldenz and Lautern, etc. Within its borders were embraced also the episcopal sees of Worms and Speyer, the free cities of Worms and Speyer, the County of Leiningen, etc. The counts palatine of the Rhine (see PALATINATE), whose original seat was Aix-la-Chapelle, appear in the eleventh century as holding a leading position among the hereditary German princes. In 1214 the Rhenish Palatinate was acquired by the house of Wittelsbach in the person of Louis I, Duke of Bavaria, and thereafter for 400 years its history is the usual story of partition and reunion, varied with occasional increase of territory through purchase. Early in the fourteenth century a part of Bavaria between the Danube and the Fichtelgebirge was made over by the Emperor Louis the Bavarian to his kinsmen ruling in the Rhenish Palatinate; this was the origin of the Upper Palatinate. In 1356 the Golden Bull of the Emperor Charles IV designated the Count Palatine of the Rhine as one of the seven Imperial Electors. Rupert I of the Palatinate founded the University of Heidelberg in 1386. Rupert III occupied the Imperial throne of Germany from 1400 to 1410. The Reformation made rapid progress in the Palatinate and, influenced by the teachings of Melanchthon, the Elector Frederick II (1544–56) embraced the reformed faith. Under Frederick III (1559–76), who inaugurated the Simmern line in the Electoral Palatinate, Calvinism was made the established religion and the Heidelberg Catechism was drawn up (1563). Frederick III also aided the French Huguenots and extended his protection to Protestant refugees from France. Frederick IV (1583–1610) became head of the Evangelical Union formed in 1608 by the Protestant states for the protection of their interests. His son, Frederick V (1610–32), son-in-law of James I of England, was elected King in 1619 by the Bohemian Protestants, whose revolt against the house of Hapsburg had inaugurated the struggle which was to be the Thirty Years' War. Frederick was defeated at the battle of the White Hill in 1620 and was deprived of his lands. The electoral dignity was conferred on Maximilian I, Duke of Bavaria, in 1623, and in 1628 this prince was formally invested with the Upper Palatinate. By the Treaty of Westphalia the son of Frederick V was restored in the Lower Palatinate, and an eighth seat in the Electoral College was created for him, the Upper Palatinate remaining in the possession of Bavaria. During the wars of Louis XIV the Palatinate, one of the richest and most fertile lands in Germany, was mercilessly devastated by the French armies in 1674 and in 1689. In 1685 the Simmern line died out and was succeeded by the collateral line of

Neuburg, whose members were of the Catholic faith. This led to the emigration, in 1709–10, of a large number of Protestant inhabitants (estimated at 13,000) to England. Thence a large body crossed over to Ireland, while others went to North Carolina, Pennsylvania, and Virginia. In 1710 between 3000 and 4000 Palatines, as they were called, settled in Columbia and Ulster counties, N. Y., whence many removed to Montgomery and Herkimer counties and to Pennsylvania. In 1742 the line of Neuberg in the Electoral Palatinate was succeeded by that of Sulzbach. In 1777 Bavaria was united with the Palatinate. By the Treaty of Lunéville (1801) the portion of the Palatinate lying on the left side of the Rhine was ceded to France, while the territories on the right bank were partitioned among Baden, Hesse-Darmstadt, Leiningen, and Nassau. The part beyond the Rhine was given up by France in 1814–15 and was divided among Bavaria, Hesse-Darmstadt, and Prussia. The Rhenish Palatinate (Bavaria) was the scene of a revolutionary uprising in 1849, which was suppressed by Prussian arms. The Bavarian government districts of the Palatinate (Rhenish Palatinate) and Upper Palatinate (Upper Palatinate and Regensburg) have an area respectively of 2372 and 3862 square miles. The population of the former in 1910 was 937,085 and of the latter, 1,600,284. The surface of the Palatinate (which is bounded on the east by the Rhine) is diversified with smiling plains, swelling hills, and wooded mountains. The western portion is traversed by the low range of the Hardt. The region yields bountiful crops of cereals, potatoes, tobacco, hemp, flax, wheat, rye, barley, etc., and is noted for its wine. The capital is Speyer. Pop., 1910, 23,045. The Upper Palatinate is traversed by the offshoots of the Fichtelgebirge, the Bohemian Forest, and the Bavarian Forest, and is bordered on the west by the Franconian Jura. The Danube flows along the southern border. The capital is Regensburg. Consult Häusser, *Geschichte der rheinischen Pfalz* (Heidelberg, 1845), and Nebenius, *Geschichte der Pfalz* (Heidelberg, 1874).

PALATINE, pălʹȧ-tĭn. A name applied in the later days of the Roman Empire to persons whose duties connected them with the Imperial court. Under Constantine the Great the Palatini were troops stationed at the capital. In the Byzantine Empire the term was applied to the officials connected with the administration of the finances and the Imperial domains. It was bestowed as an epithet of honor on persons in the entourage of the early German kings; and under the Carolingian rulers the count palatine was the highest judicial officer of the realm. He was also the principal minister of the King for administrative and sometimes for other matters. In the German Kingdom counts palatine were appointed for the various duchies, but the title ultimately became restricted to the ruler of Rhenish Franconia, whose territory came to be known specifically as the Palatinate (q.v.). In Poland each governor bore this title. In Hungary the palatine was the highest judicial officer. In England, after the Conquest, the see of Durham, the Earldom of Chester, and the Duchy of Lancaster were ruled for a time by counts palatine who were possessed of almost regal powers within their jurisdiction. Consult: Carl Pfaff, *Geschichte des Pfalzgrafenamt* (Halle, 1847); Vilmos Frankl, *Anádori és országbiroi hivatal* (Budapest, 1863); Puis Wittmann, *Die Pfalzgrafen von Bayern* (Munich, 1877); G. T. Lapsley, *County Palatine of Durham: Study in Constitutional History* (New York, 1900); Richard Schröder, *Lehrbuch der deutschen Rechtsgeschichte* (4th ed., Leipzig, 1902).

PALATINE ANTHOLOGY. A collection of Greek poems made by Constantine Cephalas in the tenth century, lost, and rediscovered in 1606 by Salmasius in the Palatine Library at Heidelberg. It was not, however, published until 1776, when it appeared in Brunck's *Analecta*. Consult Thackeray, *Anthologia Græca* (London, 1877). See ANTHOLOGY, *Greek Anthology*.

PALATINE HILL (Lat. *Mons Palatinus*). One of the famous hills of Rome, the seat of very early, perhaps the earliest, Roman settlements. In point of historic interest it ranks next to the Capitol and the Forum. Its summit is about 140 feet above the Tiber level. The form of the hill is irregularly quadrangular. Its northwestern slope, towards the Capitoline Hill and the Tiber, was called Germalus or Cermalus. The origin of the name is uncertain, although several derivations are given connecting it with legendary stories. Romulus is said to have founded the city upon this hill, and on Germalus grew the sacred fig tree (near the Lupercal) under which he and his brother, Remus, were found sucking the she-wolf. Upon the Palatine or its slopes were the temple of Jupiter Stator, the temple of Cybele, the sacred square inclosure called Roma Quadrata, and other sacred places and edifices, and, during the Republic, many of the finest private houses in Rome. Under the Empire it became especially the site of the Imperial residence. Augustus and Tiberius resided here, and at last Nero included it entirely within the precincts of his *aurea domus*, which Vespasian subsequently restricted to the hill. From the time of Alexander Severus it ceased to be the residence of the emperors, except occasionally. Recent excavations have brought to light numerous remains of the structures with which the Palatine Hill was once covered. A considerable portion of the hill remains yet to be excavated. Consult: R. A. Lanciani, *The Ruins and Excavations of Ancient Rome* (Boston, 1897); K. Baedeker, *Central Italy and Rome* (15th Eng. ed., Leipzig, 1909); S. B. Platner, *The Topography and Monuments of Ancient Rome* (2d ed., Boston, 1911).

PALATʹKA. A city and the county seat of Putnam Co., Fla., 55 miles south of Jacksonville, on the St. John's River and on the Atlantic Coast Line, the Georgia Southern and Florida, the Florida East Coast, and the Ocala Northern railroads (Map: Florida, E 2). It enjoys considerable popularity as a winter resort and is the commercial centre of a productive fruit-growing and market-gardening region, its trade interests being of considerable importance. There are large door and tank and silo factories and a saw mill. One of the water systems is owned by the city. Pop., 1900, 3301; 1910, 3779.

PALAU, pȧʹlou, or **PELEW,** pēʹlōō, **ISLANDS,** properly **BÄLAU,** bĕʹlou. A group of 26 small islands in the Pacific Ocean lying to the east of the Philippine and the Caroline islands, between lat. 7° and 8° N. and long. 134° and 134° 45′ E. (Map: East Indies, H 4). They were discovered by the Spaniards in 1545 and remained in their possession until 1899, when they were purchased by Germany along with the rest of the 680 islands of Micronesia (except Guam). They were taken by the British in 1914. (See WAR IN EUROPE.) Area, 170 square miles. The largest and most populous member of the group is Babelthuap. The southern islands are coral in origin, the northern volcanic. The surface is rugged and hilly and covered with forests. The soil is fertile and the vegetation tropical. The climate is equable and salubrious, the temperature ranging from 77° F. to 91° F. Rice is the principal food of the people; sugar cane, tobacco, breadfruit, coconuts, bananas, lemons, oranges, and other tropical fruits are grown. Only six of the islands are inhabited. Phosphate beds of some importance have been opened in the southern islands. The natives of the Palau Islands are of the Micronesian race, with slight traces of Malayan, Polynesian, and, according to some authorities, of Papuan blood. They are still among the most primitive and good-natured of the peoples of the Pacific, and are of considerable interest to ethnologists by reason of their marriage customs and other social institutions. These have been studied by Kubary in *Die sozialen Einrichtigungen der Palauer* (Berlin, 1885). The shipwreck of the *Antelope*, East Indiaman, Capt. Henry Wilson, is the theme of Keate's *Account of the Pelew Islands* (London, 1796), which has not lost its value and made Prince Lee Boo a character in the world's history. The language has been exhaustively studied by Father Salvator Walleser in *Mitteilungen des Seminars für orientalische Sprachen* (Berlin, 1911).

PALAWAN, pȧ-lä'wȧn, or PALOWAN. A general designation of the Tagbanua tribes from whom the island of Palawan took its name. See PHILIPPINE ISLANDS.

PALAWAN, or PARAGUA, pȧ-rä'gwȧ. One of the Philippine Islands, situated at the extreme west of the larger islands of the archipelago (Map: Philippine Islands, B 6). With its numerous dependent islands it forms a continuous chain extending from Mindoro southwestward to the northern extremity of Borneo. The chain runs parallel with the Sulu Archipelago and separates the Sulu Sea on the southeast from the China Sea on the northwest. The island of Palawan itself is of very elongated shape, being 275 miles long from northeast to southwest, with an average width of about 15 miles, narrowed into an isthmus 4½ miles wide a little north of the centre. It ranks sixth in size among the Philippine Islands. Its area is 4027 square miles, and with the 135 islands forming the group or administrative division 5238 square miles. The island itself is accordingly a little smaller and the group a little larger than the State of Connecticut. The principal dependent islands are the Calamianes (q.v.), lying to the north between Palawan and Mindoro, Dumarán (122 square miles), off the northeastern coast of Palawan, and Balábac (122 square miles), to the south, between Palawan and Borneo. To Balábac belong a number of small outlying islands scattered over the Sulu Sea.

The coasts of Palawan are indented with numerous small bays and sounds, some of which form excellent harbors, especially that of Malampaya (q.v.). The surface consists of an elevated table-land falling rapidly towards the coast on either side, and the latter are in some places bold and rugged with limestone cliffs. From the plateau an irregular series of summits and ridges, running generally obliquely across the island, rise to an average height of 2500 feet. The highest point is Mount Mantalingajan, in the southern part, with an altitude of 6843 feet. Unlike most of the islands of the archipelago Palawan is rarely shaken by earthquakes. Owing to shape and contour of the island the streams are all very short. The climate is regulated by the winds to which the island is exposed, the dry northeast trade winds during summer and the moist southwest monsoons in winter. These moderate the temperature, but malarial fevers are common along the coasts. The flora of the island is rich and varied, with many peculiar species, notably among the pitcher plants, the ferns, and the orchids. The mountains are covered to their summits with immense forests of valuable cabinet, building, and dye woods, including ebony, sandalwood, logwood, and many species unknown to the rest of the archipelago. There are many trees producing resins, such as dammar, gum mastic, and copal. Birds of a marked Bornean character, monkeys, and reptiles are especially abundant, the pythons reaching an enormous size.

Only the narrow coastal plains are suitable for agriculture. The smaller outlying islands are particularly suitable for this purpose. They are free from mosquitoes and other disease-bearing insects harmful to man and from the wild monkeys and hogs injurious to crops which are found on the mainland. There are practically no interior roads or trails, and the only means of transportation is by water. There is a regular interisland steamship service between the capital, Puerto Princesa, and Manila, and outside communication is also had through the port of Kudat, British North Borneo, which is only 90 miles from Palawan Island. On Palawan is found one of the scenic wonders of the Philippines. This is the underground river emptying into St. Paul Bay on the west coast. It has been explored by the Philippine government from its mouth to a point about 3½ miles inland, where the roof of the cavern descends to the water's level.

Across the bay from Puerto Princesa is the Iwahig colony, a successful experiment in modern penology. The colonists are some 1000 criminals who have won the privilege through good conduct in the penitentiary at Manila. On a reservation of 270 square miles they are to be found living in peace and carrying on industrial and agricultural pursuits under an administration controlled largely by themselves. The colonists make and execute their own laws, elect their own judges, and conduct their own jury trials, all acts being subject to veto by the superintendent.

The Culion leper colony, on the small island of Culion, is also within the limits of this province. Some 3500 lepers, gathered from all parts of the archipelago, reside in this colony. Here the scientists of the Philippine government carry on their studies of the disease and search for its cure. Those of the colonists who have been apparently cured and have no recurrence of the disease for two years are then returned to their homes.

The inhabitants of the province, including Paragua Sur, numbered 35,696 in 1903, of whom 10,918 were on the principal island. The Visayans, numbering 28,028, are the most numerous race; 6844 are classed as wild. Aboriginal Negritos inhabit the mountains of the interior; along the coast of the northern half of the island are Malays and mixtures of Malays and Negritos, known as Tagbânuas and Tandulanos. The coasts of the southern half are occupied by Mohammedan Moros. The bulk of the Christian population is found on the smaller islands, many of which are densely populated, Cuyo, e.g., having, in 1903, 7545 inhabitants on its 21 square miles. By the Provincial Government Act of June 23, 1902, the northern half of the island, lying north of lat. 10°, together with the Calamianes and other adjacent islands, was constituted as the Province of Paragua, with the seat of government at Cuyo, on the island of that name in the Sulu Sea. The portion of Palawan lying south of lat. 10°, known as Moro Palawan, was left without civil government, while the island of Balâbac, with its dependent islands in the Sulu Sea, forms a distinct political division, the local government of which was established by treaty with the Sultan of Sulu on Aug. 20, 1899. When the census of 1903 was taken there were two provinces, Paragua and Paragua Sur, which have since been amalgamated. The chief towns of the mainland are Taytay (q.v.) and Puerto Princesa (q.v.).

Palawan was a part of the Sultanate of Borneo until the beginning of the eighteenth century, when the Spanish began to found military stations on the island to protect their northern possessions from the Moro pirates. Two attempts by the Spanish authorities to colonize the island, first by importing free immigrants from Luzon and second by founding convict settlements, were unsuccessful. Palawan was occupied by United States troops during one of the early campaigns in the southern islands. Consult Marche, *Luçon et Paloauan* (Paris, 1887).

PALAZZOLO ACREIDE, pȧ-lăt′sô-lô ȧ-krā′ē-dȧ. A town in the Province of Syracuse, Sicily, 2285 feet above the sea and 22 miles west of Syracuse (Map: Italy, E 6). Near by are the ruins of the ancient Acræ, founded by a colony from Syracuse in 664 B.C. Curious remains are still to be seen, including a small but almost perfect theatre, an aqueduct, a temple, and various tombs and vases. Pop. (commune), 1901, 14,840; 1911, 15,138.

PALAZZO VECCHIO, vĕk′kyô (It., old palace). A commanding structure rising from the Piazza della Signoria in Florence and dating from 1298. It was originally the seat of the Signoria, the republican government, and later became the residence of Cosmo I. It now serves as the town hall. The most impressive portion of the building, and one of the most conspicuous objects in Florence, is the massive square tower, rising to a height of 308 feet and corbeled out so that it overhangs the street 6 feet. The court, reconstructed by Michelozzo in 1454, received its rich decorations of stucco and mural painting in 1565. The Great Hall was constructed for the Council in 1495 and remodeled by Vasari in 1567. It contains a colossal statue of Savonarola, who in 1498 was burned at the stake at the corner of the palace, on the site now occupied by the great fountain.

PALE. See English Pale.

PALE (OF., Fr. *pal*, from Lat. *palus*, stake, pale, from *pangere*, Skt. *paś*, to fix, to fasten). In heraldry (q.v.), one of the figures known as ordinaries.

PA′LEARC′TIC REGION (from Gk. *παλαιός*, *palaios*, ancient × *ἀρκτικός*, *arktikos*, northern). 1. A primary division in zoögeography embracing the northern part of the Old World, or Paleogæa. It includes all of Europe, the whole Mediterranean basin, as far south as the Atlas Mountains, Lower Egypt, northern Arabia, Syria, and Asia Minor, the whole of Asia north of the Himalayas, and Japan. It is divisible, according to the scheme of Sclater and Wallace, into four subregions, which, however, are not very clearly defined: (1) Europe north of the line of mountains running from the Pyrenees to the Caucasus; (2) the Mediterranean basin and eastward through Turkey and Persia to the Indies; (3) northern and northeastern Asia; (4) Manchuria, northern China, and Japan. It is contended by many students of the subject that this area is not entitled to rank as a grand region distinct from North America (Nearctic region, q.v.), but that the two should be joined as one called the Holarctic region or Arctogæa, and the weight of modern opinion tends towards this view. Some would include Africa in this grand division. Consult maps and authorities cited under Distribution of Animals.

2. A division of subordinate rank at times used by plant geographers. It consists of the portion of the Arctic region found in the Old World and is limited to the islands of Spitzbergen and Nova Zembla, together with the tundra region of northern Russia and Siberia. It has much in common with the remainder of the Arctic. See Arctic Region; Distribution of Plants; Phytogeography.

PALEARIO, pä′lȧ-ä′rē-ō, Aonio, or Antonio (c.1500–70). An Italian humanist and reformer, born at Veroli, near Rome. He is also called Della Paglia and Dègli Pagliaricci. He was educated in Rome and remained there until 1529, except for the interval of the siege in 1527. Afterward he went to Perosa, Siena, where he principally lived, and Padua, where he wrote *De Immortalitate Animarum* (1536), his most important work, a long didactic poem in Latin hexameters. In 1542 he wrote *Della pienezza, sufficienza e satisfazione della passione di Cristo*. The Inquisition pronounced it heretical, but Paleario defended himself against the charge with much eloquence and successfully. The tract was followed by *Actio in Pontifices Romanos et Eorum Asseclas*, which was not printed until after his death (1606). He was professor at Lucca from 1546 to 1555, and then taught at the University of Milan. The election of Pius V was the signal for a fresh attack from his enemies. He was formally accused of heresy in 1567, and after a year's imprisonment at Rome was burned at the stake in July, 1570. Paleario especially protested against the Roman Catholic doctrine of purgatory. His other works include three volumes of *Epistolæ*. An edition of his works was published at Amsterdam in 1696 and at Genoa in 1728. The tract *Benefizio di Cristo*, attributed to him, more probably is by Benedetto of Mantua.

PALEMBANG, pä′lĕm-băng′. A residency of the Dutch East Indies, embracing the region of the Musi River in the southeastern part of the island of Sumatra (Map: East Indies, B 6). It is bordered on the north by the Jambi territory, on the east by the Java Sea, on the south by the Lampongs district, and on the west by the Barisan Range. Area, 53,497 square miles. Pop., 1905, 796,352. Palembang is a low and exceedingly fertile region, subject to overflows by the rivers. It has deposits of petroleum. The inhabitants are nearly all Malays and Mohammedans. In the dense forests live the Orang-Kubu, a curious race exhibiting the lowest grade of civilization. Capital, Palembang (q.v.).

PALEMBANG. The capital of a residency in Sumatra, on the Musi River, about 45 miles from its mouth (Map: East Indies, B 6). It extends 4 or 5 miles along the river banks and lies in a swampy district which is subject to overflows. The houses are of bamboo and many stand on rafts in the stream. The town has a fine mosque, dating from the middle of the eighteenth century, the palace and tombs of the sultans, and a fort. There is a considerable commerce, coffee and pepper being the leading shipments. The chief industries are silk weaving, wood and ivory carving, and the manufacture of weapons and gold articles. Pop., 1905, 54,755, chiefly Malays and Chinese. Palembang was conquered by the English in 1812 and by the Dutch in 1821.

PALEN, pă'len, Piŏtr Alexeievitch (1745–1826). A Russian general, notorious as one of the murderers of the Emperor Paul I (q.v.). Entering the military service at an early age, he fought in the wars against the Turks and participated in the storming of Otchakov in 1788. In 1790 he became lieutenant general, was made Governor of Livonia three years later and of Courland in 1795. He was raised to the rank of count in 1799 and in the following year became head of the ministerial council. After taking a leading part in the conspiracy which brought about the death of Paul I (March 23, 1801) he continued for some time in the service of Alexander I, but retired in 1804, after which he lost all interest in Russia and Russian affairs.

PALENCIA, pà-lăn'thē-à. The capital of the Province of Palencia in Old Castile, north Spain (Map: Spain, C 1). It is situated on the left bank of the Carrión, 33 miles by rail north of Valladolid, and is an old town with narrow streets and well-preserved walls. It has a beautiful episcopal palace and a notable church of San Miguel with a massive square tower. The most prominent building, however, is the Gothic cathedral, which is beautifully ornamented within and contains a rich collection of old Flemish tapestries. The town has a hospital, a bull ring seating 8000 spectators, a provincial institute, a seminary, a normal school, and a municipal academy of arts. The chief manufactures are shawls and blankets, agricultural machinery, fireworks, chocolate, and bricks. Pop., 1900, 15,610; 1910, 18,055. The ancient Pallantia was the capital of the Vaccæi. It was taken by the Romans after an obstinate resistance, and remained an important city through the Middle Ages, being in 1074 the scene of the Cid's marriage to Ximena and becoming in the twelfth century the seat of the Castilian kings and Cortes. The university, established in 1208, was transferred to Salamanca in 1239.

PALENCIA, Diego Fernández de. See Fernández de Palencia.

PALENQUE, pà-lân'kâ. An ancient city of vast extent near the village of Santo Domingo del Palenque, in the State of Chiapas, Mexico, belonging to the great period of the ancient Maya civilization (Map: Mexico, N 9). It is located on the steep slopes of the Tumbala foothills, amid beautiful tropical surroundings. Almost impenetrable vegetation covers the country, so that up to the present only six existing ancient structures have been described, though it is believed many more exist in the forest. By a series of walled terraces level areas on the slopes have been prepared for the buildings. These were set on steep pyramids, the sides of which were faced with stone or covered with steps. Twelve of these pyramids remain in the Palenque group, the greatest height being about 80 feet. The largest building is called the Palace; the others are named Temple of the Inscriptions, of the Sun, of the Cross, of the Foliated Cross, and the Beau Relief. The ground plan and elevation of the Palenque temples show the utmost refinement of form and a remarkable development of the sanctuary. The two vaulted chambers running lengthwise of the building are the unit of construction, the complicated plan of the palace being made up of a series of such units. The vaults are really of monolithic concrete construction, but like most of the triangular Maya vaults they seem to be built on the principle of the corbel arch made of overstepping stones. The sanctuary is a miniature temple built against the back of the rear room. The carved tablets are let into the walls of the sanctuary. The exteriors of the buildings present several remarkable architectural features: above the vertical walls the roof slopes away at the slant of the arch within, resembling a mansard; the top of the roof slopes gently to the ridge, which is crowned with a high, narrow, perforate comb in the form of an arch, the walls having openings crossed with slabs resembling a grille. The exteriors of the buildings were surfaced with plaster and decorated with tinted reliefs in stucco. The mansard slope had complicated relief work, also in stucco, representing masks and figures of gods. The latticework roof comb bore decorations in high relief. The chief feature of the Palace is a unique square tower 40 feet high, of which four stories remain. The most remarkable of the Palenque reliefs are the tablets from the sanctuaries adorned with figures and hieroglyphics. On two of the tablets are crosslike objects which have attracted world-wide notice. They really represent trees, and a sacred bird is perched on the top of each. On either side are priests holding the manikin figures of gods. The tablet of the sun represents a shield on two crossed spears placed upon an altar and attended by priests. The bas-reliefs of Palenque furnish the finest examples in the New World in this sort of sculpture, and the artists of this city were also preëminent in stucco modeling. Colors were lavishly used and included black, white, blue, two reds, yellow, and green. Two important pieces of engineering are found at Palenque, one an arched bridge of masonry 30 feet wide and 40 feet long across the Otolum, and the other a subterranean arched waterway 500 to 600 feet long, 10 feet high, and 7 wide, massively built and inclosing the same stream. New artifacts have come to light at Palenque; some tombs in the pyramids have been excavated and terra-cotta figures showing the characteristic head profile and costume, beads of jadeite, spindle whorls, lance heads, obsidian knives, etc., have been found. As to the age of the structures it does not seem possible to arrive at any determination. Comparative archæology, however, shows that the builders were of the Mayan stock, which is responsible for the wonderful architectural remains of Chiapas and Yucatan.

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PA′LEOBOT′ANY. The science of extinct vegetable life; that branch of paleontology (q.v.) or the biology of the past which treats of the fossil plants and plant assemblages or floras of the globe. It derives its facts primarily from those relics of ancient vegetable life that have been preserved as fossils, but both borrows from and contributes to geology, paleozoölogy, and other sciences of earth history.

History. Unlike many natural sciences paleobotany appears to have been unknown to the ancients despite the limestone quarries of Greece, the petrified forests of Nubia, or the vast public works of the Roman Empire. Petrified wood is mentioned first by Albertus Magnus about the middle of the thirteenth century, but fossil foliage is not recorded until the time of Major (1664) in Germany and Lhwyd (1699) in England. Throughout the eighteenth century a considerable number of writers mentioned fossil plants in a casual way, regarding them usually as evidences of the universal deluge and without any definite ideas as to their real antiquity or relationships. Johann Jacob Scheuchzer (1672–1733), the great exponent of the diluvial or flood theory, published his *Herbarium Diluvianum* at Zurich in 1709, Ernst Friedrich von Schlotheim (1764–1832) published his *Beiträge zur Flora der Vorwelt* at Gotha in 1804, and Kaspar Maria von Sternberg (1761–1838) published his great work *Versuch einer geognostisch-botanischen Darstellung der Flora der Vorwelt* at Regensburg, Leipzig, and Prague from 1820 to 1838. These may be regarded as pioneer works, the real founder of the science being universally admitted to have been Adolphe Théodore Brongniart (1801–76). He published an admirable paper on classification as early as 1822, and in his *Prodrome* and *Histoire des végétaux fossiles*, the former issued and the latter commenced in 1828, he erected the firm foundation for all subsequent work, considering fossil plants as a part of the natural botanical system and discussing their distribution in space and their succession in time.

During the remainder of the nineteenth century a vast body of literature was built up by an ever-increasing number of students, of whom the most illustrious were H. R. Gœppert (1800–84) of Silesia, Franz Unger (1800–70) of Styria, Oswald Heer (1809–83) of Switzerland, Gaston de Saporta (1823–95) of France, and C. von Ettingshausen (1826–97) of Austria. In England, where the emphasis has been placed on anatomical investigations, W. C. Williamson (1816–95), following the pioneer work of H. T. M. Witham (1833) and E. W. Binney (1868), succeeded in placing this phase of the subject in so far as it relates to Carboniferous plants on a substantial foundation, and this field of activity is being assiduously cultivated by a considerable number of contemporary British botanists. In France the most active contributor to the anatomical side was Bernard Renault (1836–1904). Unger in his *Genera et Species Plantarum Fossilium* had essayed a complete manual of the subject as early as 1850, but a sufficient body of facts had not yet accumulated to give his work lasting value, although it was of immense importance at the time. This task was satisfactorily accomplished by W. P. Schimper (1808–80), the eminent bryologist of Strassburg, his *Traité de paléontologie végétale* being one of the most important single contributions to the science. The *Traité* was published in three volumes of text accompanied by an atlas of splendidly executed plates between 1869 and 1874. Schimper's talent as an organizer was again seen in his contribution to Zittell's *Handbuch der Paläontologie*, which was carried to completion in 1890 by A. Schenk of Leipzig. The pioneer workers in North America were J. W. Dawson (1820–99) in Canada and Leo Lesquereux (1806–89) and J. S. Newberry (1822–92) in the United States.

Methods of Preservation. Fossil plants have been preserved in two principal ways, the first by infiltration or petrifaction, the second by inclusion. In the first method the plant tissue is more or less completely permeated or replaced, molecule by molecule, by silicic acid, calcium carbonate, or other mineral substances such as magnesium, pyrite, marcasite, etc. According to the completeness of this replacement the internal structure is preserved with more or less fidelity, often to an extraordinary degree. Such remains preserved by calcification characterize certain horizons of the English coal measures, and similar coal balls have been discovered at Langendreer in Westphalia and Ostrau in Moravia. Silicified plant remains such as those of Saint-Etienne and Autun so brilliantly elucidated by Brongniart and Renault are characteristic of the French Permian. Fossil woods are commonly silicified at very many geologic horizons, and such is the method of preservation of the majority of cycadophyte stumps of the Mesozoic. The second method, by far the most common mode of occurrence, is by simple inclusion in clay, shale, amber, or other material, and is commonly known as incrustation. The bulk of fossil plants with which the general public is familiar belong to this type, which often show the most beautiful impressions of ferns, leaves, and even flowers—the finer grained the sediment in which the plants were entombed the more perfect being the impression. In this second class of fossils the plant substance may be present as carbon, it may be replaced by salts of iron or other mineral, or it may be entirely dissipated, leaving only the impression or cavity. Lignite beds and coal seams are examples of inclusion (incrustation) of plants en masse. Occasionally lignified remains may retain their internal structure and by special methods may be sectioned and studied microscopically.

Evolution of the Principal Types of Vegetation. The beginnings of the vegetable as of the animal kingdom are largely lost. Theoretic considerations indicate that low types of aquatic plants, at first of microscopic size, must have preceded animal life. The presence of iron carbonate, graphite, and limestones among the earliest sediments is commonly considered as the circumstantial evidence for the existence of life even when no other traces of it have been preserved.

Thallophyta. The Thallophyta, or thallus plants, comprise a vast assemblage of so-called cellular plants of which seaweeds, diatoms, bacteria, molds, and fungi are familiar examples. Modern systematists segregate this ancient group into numerous phylæ. Walcott has described gigantic lamellated calcareous deposits which appear to have been formed by pre-Cambrian and early Paleozoic algæ comparable with the modern blue-green algæ (Cyanophyceæ). This author has described a number of these forms (Cryptozoön, Weedia, Collenia, Newlandia, Kinneyia, Greysonia, etc.). He also considers that the presence of pure limestones without traces of organisms other than algæ clearly indicates the presence of bacteria as the active agents of deposition in the manner recently made known by the work of Drew, Vaughan, and Kellerman. The presence of Paleozoic bacteria was first indicated in 1879 by Van Tieghem, who found evidences of butyric fermentation in the cellulose membranes of silicified plants from Saint-Etienne. Subsequently a considerable number of fossil bacteria were described by Renault in sections of plants and coprolites, mostly from Paleozoic strata.

Traces of fungi are commonly met with from the Carboniferous onward. These are usually in the form of mycelial hyphæ, both nonseptate (Phycomycetes) and septate (Mycomycetes). They occur in fossilized plant tissues, and occasionally the minute spores or traces of oögonia or sporangia are present. Foliage preserved as impressions frequently shows traces of leaf-spot or other fungi. All of these remains are exceedingly common at all horizons where petrified or other plant remains occur, but their nature largely precludes systematic study.

Algæ are of but slight paleobotanic interest, since they are either so little resistant that they leave only illy defined impressions in the rocks or, if they had hard parts as in the calcareous algæ, they add little but antiquity to the knowledge obtained from a study of the existing species. In other words the algæ as a whole have undergone relatively slight changes during the ages, and the forms of modern seas are not greatly unlike their ancestors of primordial days.

The occurrence of Proterozoic algæ of the blue-green type has already been mentioned. Thousands of obscure tracings in the Paleozoic and later rocks have been described as examples of fossil seaweeds, but large numbers of these supposed fucoids have been shown to be casts of trails, burrows, and similar markings of worms, trilobites, eurypterids, jellyfishes and other marine organisms, while others are rill or current markings of nonorganic origin. Nevertheless there is no reason for doubting the presence of algæ from the pre-Cambrian onward, particularly where the supposed fossils show a carbonaceous residue as in the genus *Spirophyton* of the Middle Devonian. The genus *Nematophycus* of the Silurian and Devonian includes gigantic forms with their internal structure preserved, the silicified stems of *N. logani* being sometimes several feet in diameter. They have been regarded as referable to the Siphoneæ or possibly the Phæophyceæ (brown algæ). Another undoubted member of the latter group is the Upper Devonian genus *Thamnocladus.*

The Diatomaceæ (Bacillariaceæ), whose siliceous frustules accumulate as oozes in the present polar oceans and occur as fossils from the Lower Jurassic onward, sometimes are present in the Tertiary as pure beds many feet in thickness (Polirschiefer of Bilin, Bohemia; Calvert Miocene of Maryland and Virginia). Diatoms are generally common during the Cenozoic in both marine and fresh-water deposits.

The Chlorophyceæ, or green algæ, include many doubtful fossil forms and numerous others that are well authenticated, particularly in the somewhat unique order Siphoneæ. Joints of the verticillate calcareous forms occur in the older Paleozoic (Cambrian, Ordovician, Silurian), represented by the genera *Ascosoma, Primicorallina, Sycidium, Callithamnopsis,* etc. This type becomes exceedingly common at certain Mesozoic and Cenozoic horizons, as in the Alpine Triassic (*Triploporella,* etc.) and in the Middle Eocene of the Paris basin. Associated with the foregoing are species of Codiaceæ (*Girvanella, Sphærocodium, Halimeda, Ovulites*), Dasycladaceæ (*Acicularia, Cymopolia, Vermiporella, Diplopora, Gyroporella*).

The Characeæ, a somewhat isolated group among the blue-green algæ, comprises fresh and brackish water forms, is doubtfully recorded as early as the Devonian, is present throughout the Mesozoic, and common in the Cenozoic.

The Rhodophyceæ (Florideæ), or red algæ, include one family (Corallinaceæ) that is of considerable geologic importance, being represented as early as the Ordovician by *Solenopora,* and common throughout the Mesozoic and Cenozoic (Lithothamnion, Lithophyllum, etc.).

Bryophyta. The Bryophyta, or moss plants, which are of such great theoretical importance, are scarcely represented in the fossil state and may be of relatively modern genesis. A few doubtful forms referred to *Muscites* are recorded from the Paleozoic. During the Mesozoic *Palæohepatica, Marchantites,* and a few other genera are known, while both mosses and hepatics are not uncommon in the Cenozoic, particularly under exceptional conditions of preservation as in the amber deposits. Two fruiting mosses have been discovered in the volcanic ash beds of Lake Florissant in Colorado (Miocene).

The lack of the remains of terrestrial vegetation in the earlier fossiliferous rocks is largely explained when it is recalled that the most favorable conditions for their preservation are furnished by continental deposits, especially those of a lacustrine or palustrine character, and by estuary and lagoon deposits of the continental margins. Both of these classes of sediments are the first to be destroyed in subsequent cycles of erosion, consequently it is not until Devonian time, where such deposits are typically preserved, that the first unequivocal land plants, already highly organized, are met with.

Pteridophyta. This phylum, formerly made to include both Lycopodiales and Equisetales, is here restricted to the fern plants. Ferns are the most plastic of the primitive vascular plants. They are common and varied in existing floras and extend back to the oldest rocks that carry traces of a terrestrial flora. Formerly the Carboniferous flora was thought to have been largely Filicalean, but recent discoveries have proven that Sphenopteris, Neuropteris, Alethopteris, etc., were seed plants. Many true ferns were, however, present at this early time, a fact clearly indicated by the fernlike ancestry of Cycadophytes and Conifers as well as by the remains of many genera. The Paleozoic and subsequent history of the fern phylum can be briefly and graphically shown by the accompanying diagram (Fig. 1).

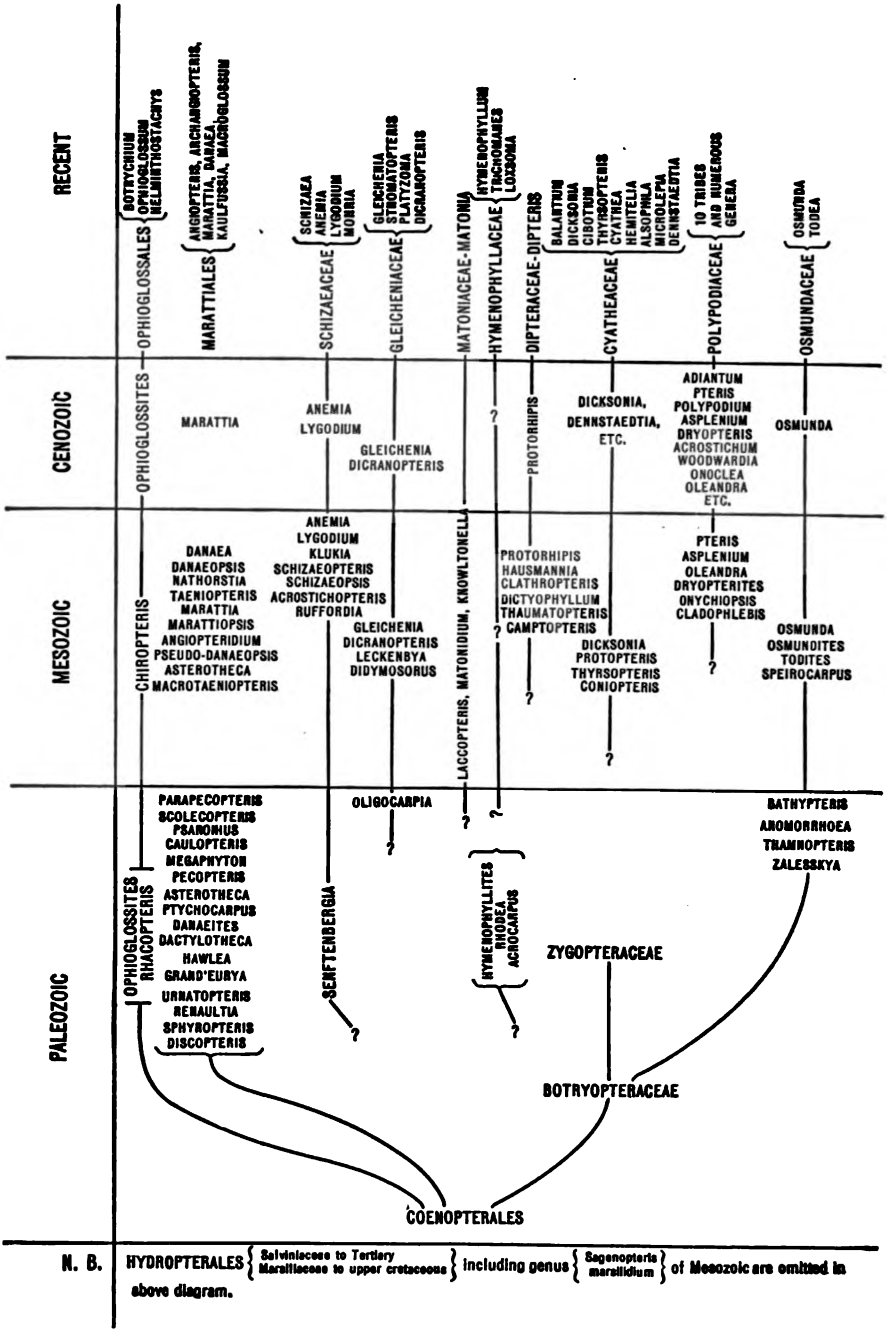

FIG. 1. DIAGRAM SHOWING THE EVOLUTION OF THE FERN PHYLUM.

Arthrophyta. The Arthrophyta constitute a separate phylum, comprising plants ranging in size from insignificant herbaceous forms to large trees, and found from the oldest horizons containing land plants to the present. It is unique in that it attained its maximum development in the Paleozoic and save for one small genus (*Equisetum*) has long since been extinct. The stems are invariably articulated and often ribbed. Leaves always in whorls (verticillate), at the nodes, free or more or less connate, dichotomously compound in the Protocalamariaceæ and Pseudoborniales, palmately laciniate in some Sphenophyllales. Hence it is inferred that the ancestors of the phylum were megaphyllous.

They are all sporangiophoric and strobiloid, although there is a rather wide variation in anatomical details. Some are homosporous and others are heterosporous. The phylum as at present known consists of three rather well-defined groups whose phylogenetic relations may be indicated by the accompanying diagram (Fig. 2).

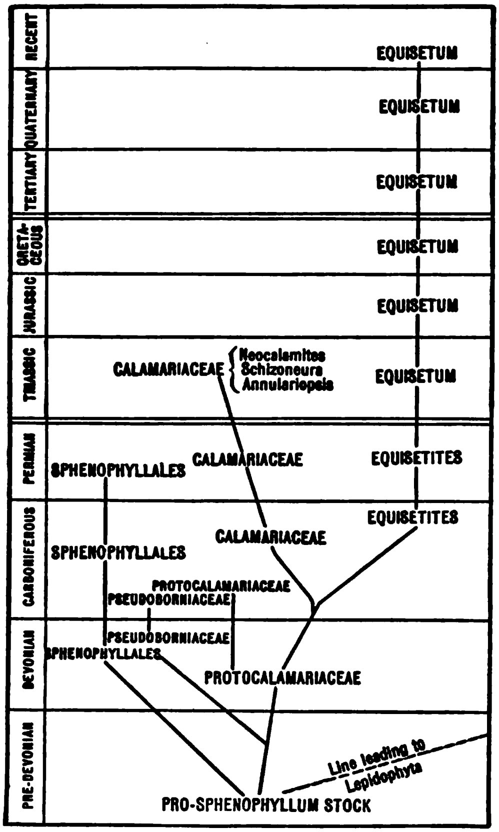

FIG. 2. DIAGRAM SHOWING EVOLUTION OF THE ARTHROPHYTA.

The Sphenophyllales, a synthetic group of mostly small forms that combine certain fern characters with those of the Lepidophytes and Calamariales, are regarded as representing the most primitive known Arthrophyte stock. They range from the Devonian to the Permian and include a large number of species founded upon impressions of their slender jointed stems with whorls of cuneate leaves. The anatomy has been worked out for several species, and one genus, *Cheirostrobus*, is known only from the petrified fructifications.

In a measure intermediate between the preceding and the primitive Calamites are the Pseudoborniales, larger forms from the Upper Devonian with decompound whorled leaves.

The Protocalamariales were an ancient group, first recorded in the Devonian and becoming widespread in the Lower Carboniferous. They are for the most part preserved as casts of stems with internodes of unequal lengths, and they have their vascular strands nonalternating at the nodes. The leaves are compound, and both the anatomy and fructifications are known in some of the species. *Bornia* and *Archæocalamites* are other generic names for these forms.

The order Calamariales includes the true Calamites, which were one of the dominant groups of the Carboniferous, often becoming large trees 100 feet tall and 6 or 8 feet in diameter, with a corresponding complexity of structure. Hundreds of species have been described, and in addition to those referred to *Calamites* there are several types of stem anatomy completely known (Arthropitys, Calamodendron, Arthrodendron), two main types of foliage (Asterophyllites and Annularia), and five types of cones (Cingularia, Huttonia, Calamostachys or Volkmannia, Palæostachya, and Macrostachya). The calamarian line, which includes plants that were primarily palustrine in their habitats, survived the Paleozoic and is represented in the Triassic by Neocalamites, Schizoneura, and Annulariopsis. So similar to the Calamites that it is grouped in the same order is the family Equisetaceæ, sparingly represented in the Paleozoic, abundant and of large size in the early Mesozoic, and dwindling with the passing of time, surviving to the present in about a score of species of *Equisetum*, the horsetail or scouring rushes. Lack of space prohibits any details, but the phylogenetic relationships and something of the geologic history of the Arthrophyta are indicated by the accompanying diagram (Fig. 2).

Lepidophyta. The Lepidophyta constitute another great phylum, largely extinct and represented in recent floras only by the inconspicuous club mosses (Lycopodiales) and two other small orders (Isoetales and Psilotales). The members of this phylum all have small scalelike leaves, but appear to have been derived from ancestors similar to if not identical with the ancestors of the Arthrophyta. Like the latter they underwent a wide adaptive radiation in the Paleozoic, during which time they are represented by a host of forms some of which were large complex trees—the well-known Lepidodendrons and Sigillarias, with their geometrically ornamented cortex of leaf bolsters. Their anatomy, fructifications, and habits are thoroughly known, and some had practically attained the seed habit (Lepidocarpon, Miadesmia, Mazocarpon). The whole phylum became almost entirely extinct with the close of the Paleozoic. Their history and phylogeny are indicated in the accompanying diagram (Fig. 3).

Pteridospermophyta. An entirely extinct and synthetic group, including stems formerly classed as Cycadofilicales, that shows some of the stages of the evolution of seed plants from ferns during the Paleozoic. There are several families with the habit and foliage of ferns—the fronds known as Sphenopteris, Neuropteris, Aneimites, etc., and the stems known as Lyginodendron, Heterangium, Medullosa, etc. These have been shown to have borne large complex gymnospermous seeds somewhat like those of modern Cycads, the best-known genus to which these seeds have been referred being *Lagenostoma*. The stems become complex during the later Paleozoic and lead in the direction of the Mesozoic cycad-like plants. The Pteridosperms, or seed ferns, are not certainly known subsequent to the Paleozoic, but they probably survived into the early Mesozoic.

Cycadophyta. The fronds of cycad-like plants are known as early as the Carboniferous, but the group reached the zenith of its development during the Mesozoic, at which time it diverged in two main lines—the Williamsoniæ, with columnar branched stems and variously modified fructifications of the Williamsoniæ type, and the Cycadeoideæ, with large conical stems covered with an armor of old leaf bases among which the remarkable bisporangiate fructifications were borne in large numbers.

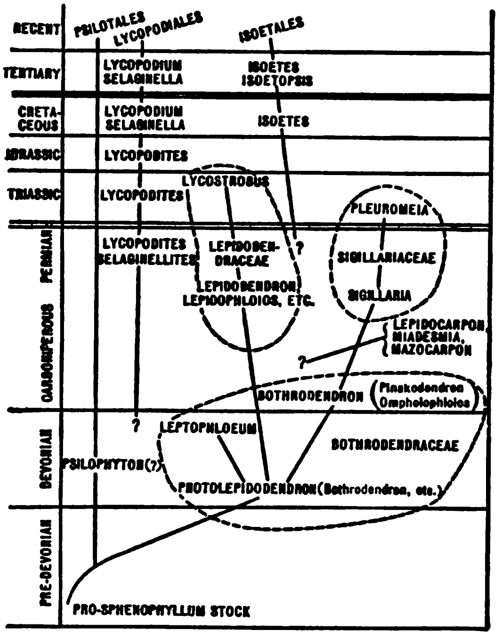

FIG. 3. DIAGRAM SHOWING THE EVOLUTION OF THE LEPIDOPHYTA.

The various frond genera, *Zamites*, *Pterophyllum*, *Nilsonia*, *Ptilophyllum*, *Sphenozamites*, etc., became practically world wide in their range during the Jurassic, but few if any of these Mesozoic forms survived into the Cenozoic, being represented during the latter period by the Cycadaceæ, of which nine genera with about 100 species still exist in the tropical and subtropical regions of the globe.

Coniferophyta. This group has left a longer and more continuous record than any other phylum. It is represented in the earliest assemblage of land plants that is known and its members still cover vast forested areas—the pines, hemlocks, and spruces in the northern hemisphere and the podocarps and araucarians in the southern. In their beginnings they were probably of fern ancestry, but they diverged from the Pteridosperms early in the Paleozoic and assumed relatively modern structures and habits. The most ancient group, the Cordiatales, included large trees and attained the zenith of development and became extinct or nearly so during the Paleozoic. Their petrified woods, often referred to the genus *Dadoxylon*, are very similar in structure to that of the Mesozoic and recent Araucariaceæ.

Another ancient group, the Ginkgoales, starts in the Carboniferous or earlier (Psygmophyllum, Ginkgophyllum, Whittleseya), becomes widespread during the Mesozoic (*Ginkgo*, *Baiera*), and after the close of the Mesozoic is represented by the genus *Ginkgo*, of which a single species has been preserved from total extinction by cultivation in the temple gardens of eastern Asia.

The order Coniferales, which includes the bulk of existing species of gymnosperms, is divided into a number of families and was particularly diversified during the Mesozoic. The oldest forms belong to the family Araucariaceæ, which were cosmopolitan during the Jurassic and Cretaceous, but whose modern representatives are confined to the Southern Hemisphere. The genera of Coniferophytes are too numerous for enumeration and only a few of them will be even mentioned. The genus *Walchia* characterized the late Paleozoic; *Palissya*, *Albertia*, *Cheirolepis*, *Voltzia*, etc., characterized the Triassic; *Araucaria*, *Pagiophyllum*, *Brachyphyllum*, etc., were prominent during the Jurassic; and *Sphenolepis*, *Sequoia*, *Widdringtonites*, *Nageiopsis*, etc., are typical of the Cretaceous. The Cenozoic genera are almost entirely those that still survive.

Angiospermophyta. The flowering plants appear in the geologic record towards the close of the Lower Cretaceous, although theoretic considerations point to their having a quite considerable ancestry which is as yet unknown. From the late Cretaceous onward its members are the dominant plants and are estimated to comprise over 100,000 existing species. They have the most highly organized vegetative as well as reproductive structures. The earliest types, unfortunately but imperfectly known, include a number of synthetic forms. Many of the existing arborescent genera appear before the close of the Upper Cretaceous, and there is a great modernization of the flora in Eocene times, and genera with a restricted modern range are more or less cosmopolitan during some part of the Tertiary. The largely herbaceous families of the cool temperate and boreal zones appear to have been largely postglacial in origin. Many thousands of species have been described, and nearly all the modern families are represented in the early Tertiary, the exceptions being the most highly evolved forms, such as the Orchidaceæ among the Monocotyledonæ and the Compositæ among the Dicotyledonæ.

The general filiation and relative differentiation of the preceding groups of vascular plants is indicated by the accompanying diagram (Fig. 4).

General Principles. The general principles which the study of paleobotany has elucidated or illustrated can only be indicated. First of all the history of the vegetable kingdom shows a gradual transformation from early simplicity to later complexity and an increasing differentiation of structure and habit in the successively higher groups, thus exemplifying the universal principle of evolution. The original scene of plant activity was the ocean, but gradually the main theatre of operations was transferred to the land, and each successive group that appeared upon the scene illustrated another great principle, viz., that of adaptive radiation. By adaptive is meant that process of progressive changes in each group (the mutations of Waagen) by means of which members of the group became adapted for a great variety of environments and tended to occupy all of the available situations on the land, some even returning to an aquatic existence. Plant history shows one group after another repeating this process of expansion—the Pteridosperms, Lepidophytes, and Arthrophytes during the Paleozoic; the Ferns, Cycadophytes, and Conifers during the Mesozoic; and the Angiosperms during the Cenozoic and Recent. This succession of dominant groups also illustrates what have been called race periods. This is illustrated by the accompanying diagram (Fig. 5), which also shows in a general way the total evolution of the vegetable kingdom during past times.

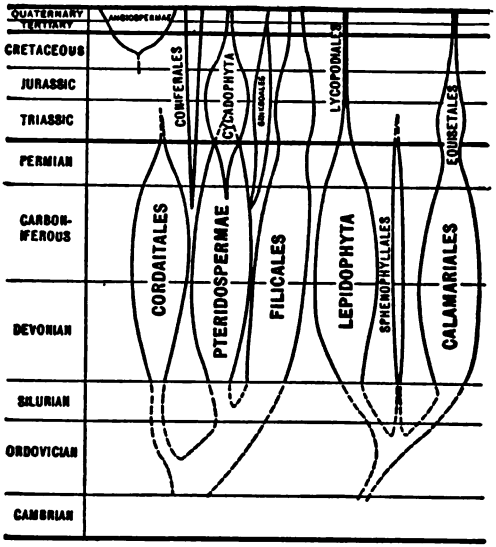

FIG. 4. DIAGRAM SHOWING THE GEOLOGIC HISTORY OF VASCULAR PLANTS.

dividual organs in localized situations where ancestral characters tend to linger, as in peduncles of fructifications. Modern seedlings often repeat the structures and forms of their remote ancestors and pass rapidly through a series of changes comparable to those through which the race has passed. Among the higher plants this principle may be illustrated by the genera *Comptonia, Liriodendron, Platanus,* etc.

Relation of Paleobotany to Other Sciences. Paleobotany is really the study of the vegetable kingdom throughout all time, while the science of botany as commonly understood is the study of the plants of but one geologic period, the Recent. It is therefore unnecessary to point out in detail the contributions of paleobotany to botany. It may be mentioned that no existing phylum except the most recent (Angiospermophyta) can be reasonably understood without a consideration of the extinct groups. The Pteridospermophyta are wholly extinct; the vast majority of the Lepidophyta, Arthrophyta, and Cycadophyta are extinct, and these extinct forms exhibit features that would be undreamed of from the mere study of the existing species of *Lycopodium, Equisetum,* or Cycadaceæ; the Coniferophyta include many more extinct than recent forms, and the genesis and filiation of even the angiosperms cannot be properly evaluated without a consideration of their history. Furthermore, any attempt to understand the geographical distribution of existing plants without a knowledge of their former migrations and ranges is futile.

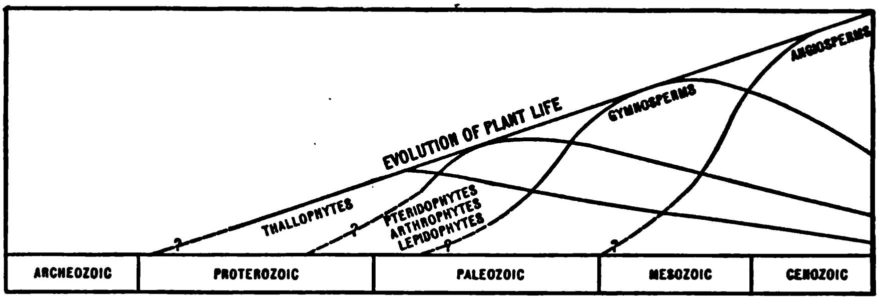

FIG. 5. DIAGRAM OF THE SUCCESSIVELY DOMINANT TYPES DURING THE EVOLUTION OF PLANTS.

In accordance with the a priori conclusions of the doctrine of evolution the early forms of plants are found to be of a generalized or synthetic type, i.e., they combine characters of various categories that subsequently become characteristic of diverging lines of evolution. Thus, all the earlier plants had motile sperms, none had true vessels such as now characterize the wood of angiosperms, and many features of this sort could be enumerated. Such a synthetic group is the Pteridospermophyta, that combined the characters of ferns and cycads. Another such synthetic group is the Sphenophyllales, which combine some fern features with the characters that subsequently became stereotyped in the Lepidophytes and Calamariales.

Another principle that paleobotanical study has reënforced is that known as recapitulation, which simply means that ontogeny or individual development tends to present a more or less clear abridgment of phylogeny or racial development. This evidence is furnished in a variety of ways, one of the most fruitful lines of attack being the study of juvenile forms or of in-

Paleobotany also makes important contributions to paleogeography. From a study of what is sometimes called paleoecology, or the relations of plants to their environments in past times, it is possible to deduce something of the topography, temperature, and rainfall of even remote geologic time. Fossil terrestrial plants are such a good index of former conditions that they have been called the thermometers of geology. The forms and sizes of the fossil leaves indicate the varying conditions of sunshine, shade, and humidity; stem structures give evidence of uniformity or seasonal changes; and root structures indicate the character of the substratum. Thus combined with the facts of paleozoölogy and geology the facts of paleontology enable us to picture the physiography and climate of bygone ages.

Paleobotany is sometimes considered a department of geology or earth history, and in a sense this is an eminently proper conception. In addition to its own body of facts and deductions as an independent science, paleobotany furnishes evidence useful in the other physical sciences of earth history, as is outlined in the preceding paragraphs. Its results are also of very special application to stratigraphic geology. Irrespective of their botanical interest fossil plants serve as medals of creation and enable geologists to recognize and correlate strata over wide areas from a knowledge of their contained fossils. Because of their sensitiveness to changing environments and their ready means of dispersal, plants are better fitted for purposes of correlation than any other organisms, and this phase of paleobotanical study has been brought to a high degree of efficiency in recent years, particularly in the United States. It thus becomes of the greatest value in economic geology, particularly in connection with the exploitation of coal deposits. The general works quoted in the appended bibliography will enable the student to get in touch with the special literature of the science. Particular interest will be found attached to the accounts of former Arctic and Antarctic floras and to the peculiar flora known as the Glossopteris flora, which flourished under rigorous climatic conditions in the tropics and throughout the southern hemisphere towards the close of the Paleozoic.

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PA'LEOG'RAPHY (from Gk. *παλαιός*, *palaios*, ancient + *-γραφία*, *graphia*, writing, from *γράφειν*, *graphein*, to write). In its widest signification the science which treats of the writing of the ancients and that of the Middle Ages. It includes within its scope the study of all marks or characters which may be designated as writing, whether on materials regarded as indestructible or destructible, such as parchment (q.v.), papyrus (q.v.), on vases (see VASE), on potsherds (see OSTRAKA), etc. The term is commonly used, however, in a more restricted sense, and denotes the science which treats of writing on destructible material. Hence we may define Greek and Latin paleography as that branch of the general science of paleography which is concerned with the writing of those languages, found on such material as wax, papyrus, parchment, and paper, and dating from the earliest times. Historically the science of Latin paleography owes its origin to the demands of diplomatics or the study and criticism of ancient legal documents. Gradually paleography assumed an importance of its own, and finally became a distinct science when the importance of diplomatics diminished after the French Revolution. The interest aroused by Latin documents led to the study of Greek paleography, through the investigation of the writings of the Greek Church fathers. The field of Greek paleography is limited in comparison with Latin paleography, as the Greek letters were used for only one language, but the Latin alphabet served for the whole of western Europe.

Letters and their Forms. Letters may be classed in a general way as majuscules and minuscules. The former are either capitals or uncials. Capitals are either square, such as are found in the most carefully made inscriptions, or rustic, which are drawn with greater freedom with cross strokes oblique and short. Uncials are modified capitals arising from the favoring of curves and avoiding of angles inasmuch as they are the production of the pen on papyrus. Minuscules are the result of the rapid and inartistic writing of majuscules, which have been changed in form and reduced in size. The forms of letters were also influenced by the material upon which they were written. Those made on soft substances show curved lines, while letters on stone or metal are angular.

Materials. The materials used by mankind for purposes of writing have varied much. Leaves and bark were employed in a primitive state of society. Linen was used by the Egyptians, and by the Romans for their religious books. Clay was inscribed or stamped by the people of Babylonia, Assyria, and Egypt, and by the Greeks and Romans. Bronze was used by the Romans for legal documents, such as the *diplomata*, giving privileges of citizenship and legal marriage to the soldiers, and lead served also for documents and dedicatory inscriptions. Stone inscriptions belong to the science of epigraphy. (See INSCRIPTIONS.) Wax tablets were used by the Greeks and Romans for writing purposes, a use which continued through the Middle Ages and down to modern times, as in the fish markets at Rouen. These were made of wood or ivory in a rectangular form and had a smooth surface slightly sunk and bordered by a rim. The surface was covered with black wax, in which the writing was made by means of a stylus, a sharp-pointed instrument of bone, ivory, or metal. These tablets might be used singly, or two or three could be bound together. Many wax tablets have been found, as in the mines of Dacia, which date from 131 to 167 A.D., and at Pompeii, dating from 15 to 62 A.D. Papyrus (q.v.) was very commonly used as a writing material in Egypt, Greece, and Italy. Papyrus rolls found at Herculaneum, which was destroyed 79 A.D., preserve the earliest Latin writing on this material. Next in date are the deeds of Ravenna, running from the fifth to the tenth century A.D. Of the fifth century are the fragments which contain rescripts written in a Roman cursive and addressed to Egyptian officials. The use of papyrus continued through the Middle Ages to some extent for literary works and regularly for papal documents down to the eleventh century. Parchment (q.v.) was first employed by the Greeks and the Romans simply as a cover for the rolls of papyrus, and its use for books dates from the latter part of the first century A.D. The term used in modern times for any kind of skin book is "vellum," which properly designates calfskin. Vellum was employed until the fourteenth century, when paper made from rags generally took its place. Paper made from cotton had been used for Greek manuscripts in the thirteenth century. As suggested above, papyrus assumed the roll form, or *volumen* proper. Parchment, on the other hand, was made up into book form in imitation of the wax tablets. See Codex.

Greek Paleography. The science of paleography as applied to the study of Greek writing on papyrus is of modern date. Greek papyri were discovered at Herculaneum in 1752, and, in 1778, 40 or 50 rolls were found in Egypt, which with one exception were afterward destroyed. In 1820 a large number belonging to the second century B.C. were found at the Serapeum in Memphis. During the next 30 years there were discovered at intervals important literary papyri, as in 1821 the Bankes *Iliad* (the last book), in 1847 orations of Hyperides, and in 1849–50 the Harris Homer (parts of *Iliad* xviii, and in book form books ii–iv). Far more important discoveries were to follow. In 1877 many fragmentary papyri of a more literary character belonging to the Byzantine period were unearthed at Arsinoë in the Fayum district. In 1892, at Socnopæi Nesus, in the same district, another group was found containing documents ranging from the beginning of the first century A.D. to the middle of the third. In 1889–90 Flinders Petrie found that the cartonnages of mummy coffins at Gurob were made of papyri, written in the third century B.C., which proved to be fragments of documents and of literary works, among them part of the lost *Antiope* of Euripides. Fortunately some papyri were also deposited with the dead and were thus preserved in fairly good condition. Among these were the *Constitution of Athens*, by Aristotle (q.v.), the Mimes of Herondas, the oration of Hyperides against Athenogenes, and portions of the odes of Bacchylides. In 1896–97 Grenfell and Hunt, acting for the Egyptian Exploration Fund, discovered at Behnesa, the ancient Oxyrhynchus, thousands of papyri, fragments of literary works, and complete rolls of nonliterary character. Among these were the famous Logia or sayings of Christ, parts of the Gospel of Matthew, and pieces from classical writers. They range in date from the first to the seventh century A.D. (See Grenfell, Bernard Pyne; Hunt, Arthur Surridge.) In 1902 was found in Egypt a papyrus manuscript of the "Persians" of Timotheus (q.v.). For the discoveries since 1906, consult *The Year's Work in Classical Studies* (London, 1907–15, which deals, too, with the literature, in books and periodicals both called forth by the finds of manuscripts) and the article "Philology, Classical," in the New International Year Book (1907–15).

Previous to these discoveries of the last 40 years it was customary to classify Greek papyri according to the style of writing, as the literary or book hand or, again, the cursive. Although these differ in their general style there is no set form for each. Writing on vellum may be classed as uncial and minuscule, and this distinction can be sharply drawn in the Middle Ages, when the literary hands were settled. This is not true, however, of the papyrus period, for it is impossible to distinguish uncials and minuscules, both of which may be written cursively. The uncial of the mediæval period is a lineal descendant of the literary style in the papyri, but the mediæval minuscule is a new letter, based on the cursive but molded into an exact form and becoming finally the regular hand of the literary style. Three periods in the history of Greek writing on papyrus may be recognized. These correspond to political changes: the Ptolemaic, 323–30 B.C., marked by freedom and breadth of style; the Roman, from Augustus to Diocletian, marked by roundness and curved, flowing strokes; and the Byzantine, from 360 A.D. to the Arab conquest of Egypt in 640, marked by a large, handsome style.

It is possible that the earliest extant example of writing on vellum is an Egyptian fragment of two leaves containing part of Demosthenes' speech *De Falsa Legatione*, in a hand like that of the Herondas papyrus, written perhaps in the early part of the second century A.D. This is a rare example, and we do not find a rapid increase in the use of vellum until the fourth century, when literary works on papyrus are almost entirely lacking and vellum was substituted for papyrus. The oldest vellum manuscripts, excepting the fragment of Demosthenes, are the great uncial codices of the Bible, the *Codex Vaticanus* and the *Codex Sinaiticus*. Manuscripts written in Greek minuscules are numerous. They are classified as the *vetustissimi*, from the ninth to the middle of the tenth century; the *vetusti*, from the middle of the tenth to the middle of the thirteenth century; the *recentiores*, from the middle of the thirteenth to the middle of the fifteenth century; and the *novelli*, all of later date. These show varying styles of minuscule, the earliest being the most simple and exact.

Latin Paleography. In studying the history of Latin paleography we begin with majuscule writing as found in the earliest Latin manuscripts extant, such as the Vergil of the fourth century. Uncials may be recognized in Latin paleography by the letters ϵ and ϵ and also by rounded forms of D and H. As a literary hand the uncial writing runs from the fifth to the eighth century. The cursive hand generally used influenced the more limited literary majuscule hand, so that a style designated the half-uncial finally became the book hand. The earliest examples of the cursive style are the wall inscriptions and wax tablets of Pompeii, written before 79 A.D. The style of writing differed very slightly in the first three centuries of the Christian era. From the cursive hand came the so-called national hands, which assumed an individuality according to the locality in which they held sway. The Lombardic is the writing of southern Italy as practiced in the monasteries of Monte Cassino and La Cava, and lasted from the ninth to the thirteenth century. The Visigothic was employed for books and documents in Spain from the eighth to the twelfth century. The Merovingian appears as a book hand on manuscripts of the seventh and eighth centuries. It never reached the calligraphic form, which marked the highest development of the other national hands, for it was supplanted by the round minuscules of the Carolingian reform. The Irish and Anglo-Saxon writing must be mentioned apart from the national hands, for it was not derived from the cursive style, but from the half-uncial which was brought to Ireland by the missionaries in the sixth century. One important peculiarity of the Irish hand is the tendency to calligraphic forms and ornamentation of the manuscripts, as in the famous *Book of Kells* of the latter part of the seventh century. The Irish hand found its way into the northern part of Britain, so that the English hand may thus be traced to the Roman half-uncial.

The reform of writing which marked the reign of Charlemagne was initiated by a decree of 789 for the revision of Church books. It had its origin in the monasteries of France, particularly at Tours, where, in the abbey of St. Martin, under the direction of Alcuin of York, much attention was given to writing. A new hand was the result, which is known as the round Caroline minuscules. These are small uncials of the true Latin form modified by cursive influences, and they became the literary hand of the Frankish Empire. In the tenth century these minuscules began to spread, and in the eleventh century they began to assume their individual form in various nations of Europe. This was the starting point of the history of modern hands, which are traced to the Roman alphabet. In the twelfth century the so-called Gothic writing appeared, which is simply the Caroline minuscule with angles replacing the curves. The writing of the fourteenth century shows a gradual decline and the letters become less distinct and are less carefully made. Nevertheless a renaissance in Italy in the fourteenth century gave a very regular and beautiful style, the humanistic hands of the fifteenth century, which had great influence on the type forms. These minuscule letters were the ancestors of the lower-case letters of the Roman alphabet, and the Gothic form of the same gave the German lower-case letters.

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Abbreviations: Walther, *Lexicon Diplomaticum* (Ulm, 1756), is still the standard work. Chassant, *Dictionnaire des abbréviations* (2d ed., Paris, 1884), is a convenient handbook. Consult also: Allen, *Notes on Abbreviations in Greek Manuscripts* (London, 1889); Cappelli, *Dizionario di abbreviature latine ed italiane* (Rome, 1899); E. M. Thompson, *An Introduction to Greek and Latin Palæography*, pp. 75–90 (Oxford, 1912); and for English documents, Martin, *The Record Interpreter* (London, 1892). See also PALIMPSEST.

PA'LEOLITH'IC PERIOD. The paleolithic period corresponds roughly in time to the middle and upper portions of the geologic epoch known as Pleistocene or Quaternary, as distinguished from the neolithic period (q.v.), which corresponds to the geologic present or holocene. It was originally supposed to be the oldest age of stone and is still so considered by some authorities. Others would have the paleolithic antedated by the eolithic period, which in point of time would correspond to the Lower Quaternary and perhaps extend even into the Tertiary epoch. The practical impossibility of drawing a hard and fast line of demarcation between the artificial and the fortuitous chipping of flints can hardly be regarded either as proof or disproof of the existence of man-used eoliths. The probabilities are in favor of them; the evidence against them is negative. The question, however, of how far back in geologic time one must go before the probabilities reach a vanishing point and man-used flints no longer occur is still an open one and is likely so to remain for a long while to come, though some investigators accept the existence of an eolithic period composed of two culture epochs, the Mesvinian and the Mafflean (qq.v.).

Chellean Epoch. The paleolithic period admits of division into several epochs. These epochs are named for localities where the culture of the epoch in question is supposed to be well represented.

To the initial stage of the paleolithic period Rutot has given the name Strépyan. By others the Strépyan is looked upon simply as early Chellean. The name Chellean, chosen by G. de Mortillet, is from Chelles (Seine-et-Marne), where extensive gravel pits have been exploited.

The various cultural epochs of the paleolithic period and the types that distinguish them hold good for Europe. Whether the system can be extended geographically so as to apply without serious changes to other parts of the world occupied by paleolithic man remains to be seen.

The one distinctive implement of the Chellean epoch is amygdaloid in shape, at first called by the workmen cat tongue and later *hache de Saint-Acheul*. It was renamed *coup de poing* by G. de Mortillet, because it was supposed to be held in the hand while in use. The German name is *faustkeil*. In a recent work Prof. W. J. Sollas has thought to improve on the name by changing it to *boucher*, in honor of Boucher de Perthes, who was the first to focus the attention of the scientific world on flint implements of this type. Two isolated discoveries of *coups de poing* had been made, previously, that by John Frere at Hoxne (Suffolk) in 1797 and that at Gray's Inn Lane, London, about 1690.

The Chellean *coup de poing* is roughly chipped on two sides, hence its general resemblance to an almond in shape. The base is enlarged, thick, and rounded, with often a bit of the nodular crust left intact. The upper two-thirds slope to a more or less well-defined point; the margins are distinctly sinuous. This implement varies in size and shape, and its uses must have been varied (*instrument à tout faire*). Those with sharp points might well have served as poniards or for boring purposes.

Industrial forms associated with the *coup de poing* include disk-shaped implements and numerous tools such as side scrapers, end scrapers, knives, spokeshaves, points, etc. These are evidently derived in part from the chips removed in producing the *coup de poing*.

In recent years the valley terraces of the Somme River have attracted more attention than those of the Marne. Abbeville and Saint-Acheul first came into prominence with the discoveries of Boucher de Perthes, Rigollot, Prestwich, Gaudry, and others. Many of the implements found then were of Chellean age, but the stratigraphic position of the Chellean industry is much better defined now than it was at that time. It is found in the lower gravels, not only of the lowest or fourth terrace (the more highly developed forms), but also of the third terrace (the earlier, ruder forms). The industry found in the gravels of the second terrace is pre-Chellean; so also is that at the base of the lower gravels of the third terrace.

Since Chellean artifacts occur in the last two terraces the cutting of the Somme valley from immediately below the second or high terrace, 54 meters above sea level at Amiens to its bottom, now partly refilled, practically all took place during Chellean times. The Chellean epoch therefore was relatively very long. In the one valley terrace at Chelles previously mentioned De Mortillet noted a division of the Chellean deposit into two horizons and on the strength of this postulated a long duration for the Chellean epoch.

Acheulian Epoch. As was the Chellean so is likewise the Acheulian characterized by the so-called *coup de poing*. In both cases the chipping is done by percussion. The Acheulian *coup de poing* is distinguished from the Chellean by a marked improvement in the art of chipping flint. The chips removed are smaller, thus making it possible to reduce the thickness of the implement as well as the sinuosity of its edge. The older Acheulian types are derived directly from the Chellean. The principal one of these is the *limande*, so called from its resemblance in shape to a flounder—oval, flat, completely chipped on both faces, even at the base or hilt.

The types of the upper Acheulian represent the acme of workmanship reached in the production of *coups de poing*. The specimens are thinner and lighter and the retouching is carried farther. One of the characteristic forms is distinctly triangular; another is long and pointed. As in the Chellean horizons the Acheulian *coup de poing* is accompanied by disk-shaped implements (probably derived from the *coup de poing*) and a variety of artifacts consisting of flint chips or flakes, more or less altered through retouching, use, and accommodation—knives, several kinds of scrapers, drills, the so-called Levallois type, etc.

The stratigraphic position of the Acheulian is immediately above that of the Chellean, occurring as it does at two distinct levels in the ancient loess of the middle (third) terraces—the later more highly perfected forms in the *limon rouge fendillé* or altered weathered upper layer of the ancient loess; the earlier forms, including the *limande*, at two levels near the base of the ancient loess. Isolated finds of Acheulian implements have also been noted from the intermediate layers of this old loess. Perhaps nowhere else is the industry so well typified and its geologic horizon so distinctly indicated as at Saint-Acheul; hence the appropriateness of the name Acheulian for the epoch, a claim also supported on grounds of priority.

The fauna associated with the lower Acheulian culture at Saint-Acheul includes *Elephas antiquus*, a very large horse, a large ox, *Cervus elaphus*, and such shells as *Belgrandia marginata* and *Unio littoralis*. Towards the middle of the old loess one finds the large horse (not like the small Mousterian horse), a species of large lion, *Cervus elaphus*, and *Lepus cuniculus;* the last two apparently point to a temperate climate. At the top in the red limon the fauna includes cold-loving animals—the mammoth and the woolly rhinoceros, but not the reindeer.

Mousterian Epoch. The type stations of the Chellean and Acheulian epochs were in valley deposits. That of the Mousterian epoch is a cave or more properly speaking a rock shelter. The position of the Mousterian epoch in the paleolithic series is one about which opinions differ, according as the paleolithic period is to be divided into two or three primary subdivisions. If there are to be but two subdivisions then the Mousterian would be the final phase of the lower paleolithic. Otherwise it might be considered as the second of three subdivisions or as an epoch of transition between the lower and upper paleolithic. For the sake of simplicity at least it will be considered here as the last epoch of the lower paleolithic.

The Mousterian epoch derives its name from Le Moustier, a small village on the Vézère River in the Commune of Peyzac (Dordogne). The paleolithic station is in the cliff just back of the village and is one of many stations in the Dordogne partially explored by Lartet and Christy prior to June, 1864. The stations of Naulette (q.v.) in Belgium, and of Krapina (q.v.), in Hungary, should be noted. See MAN, *Ancient Types*.

The Mousterian epoch witnesses the degeneration of the *coup de poing* and its final disappearance. In this process the implement lost rapidly in size and weight. The Chellean *coups de poing* averaged the largest. An improved technique made it possible to reduce the size of the implement during the Acheulian epoch, and this progressive reduction continued until their complete disappearance in Mousterian times.

Coincident with the disappearance of the *coup de poing* and even earlier there appear the two types of flint implement that characterize the Mousterian epoch, viz., the so-called Mousterian point or *pointe à main* and the side scraper or *racloir*. The point is produced from a chip more or less triangular in shape. The bulb end forms the somewhat irregular base, while the two margins, usually somewhat arched, slope away to a well-defined point. The chipping and retouching show only on the outer face; the inner or bulb face presents a single surface of fracture. These points were simple tools and perhaps also weapons. They were held in the hand between the thumb and flexed forefinger; they might also have been hafted (Bourlon). The point served as a drill, awl, punch, or as the point of a knife. The margins were knife blades, saws, or scrapers. The Mousterian point is the prototype of a two-edged pointed knife blade; it might likewise have been the prototype of the arrowhead and spearhead.

Closely related to the point is the side-scraper; the latter averages somewhat the larger and was evidently often produced from chips of shapes and sizes not easily converted into points, which accounts for its occurrence in such relatively large numbers. A single margin, often arched, was selected for use as a scraping edge and treated accordingly. Here also the retouching is seen only on the outer face, the inner consisting of a single fracture plane. The side scraper was employed as a skinning knife and in cleaning skins. No doubt it served also as a carving or chopping knife. It required no hafting, being simply held in the hand. Given a large enough series of points and side scrapers, the gradual merging of one type into the other is found to be complete. An inventory of Mousterian flint implements also includes disks, gravers, drills, spokeshaves, saws, hammerstones, and somewhat diminutive survivals of the *coup de poing*.

The Mousterian epoch is likewise characterized by the first appearance of a rude but unmistakable industry based on the use of bone. In 1905 Dr. Henri Martin found in the rock shelter of La Quina (Charente) bones, chiefly metacarpals and metatarsals, that bore the marks of having served as chopping blocks or other similar uses. The following year at the open-air station of Les Rebières (Dordogne) Dr. Eugène Pittard discovered not only metacarpals, metatarsals, phalanges, and fragments of diaphyses that had served as chopping blocks, but also rude pointed bone tools. Discoveries of a like nature have since been made at other Mousterian stations.

Relics of the Mousterian epoch are found not only at the base of cave deposits but also at and near the base of the recent loess of valley deposits. On the plateaus of northern France there is a yellowish limon without flinty layers. The surface of this plateau is altered and forms the brick earth of the plateaus, in which one finds Mousterian industry. At certain points on the valley slopes the chalk is almost denuded and the Mousterian is found on the surface of the soil; the same thing is true of the Tertiary buttes, which dominate the plateaus. Mousterian surface finds are not so important archæologically as are those discovered in situ in deposits that can be dated. The Mousterian occurs in the flinty layer at the base of the recent loess or in flinty layers at the base of its subdivisions in both the fourth and third terraces (Montières and Saint-Acheul). Moreover, in a thin bed of whitish sands and gravels of the fourth terrace at Montières there is a Mousterian industry associated with a warm fauna.

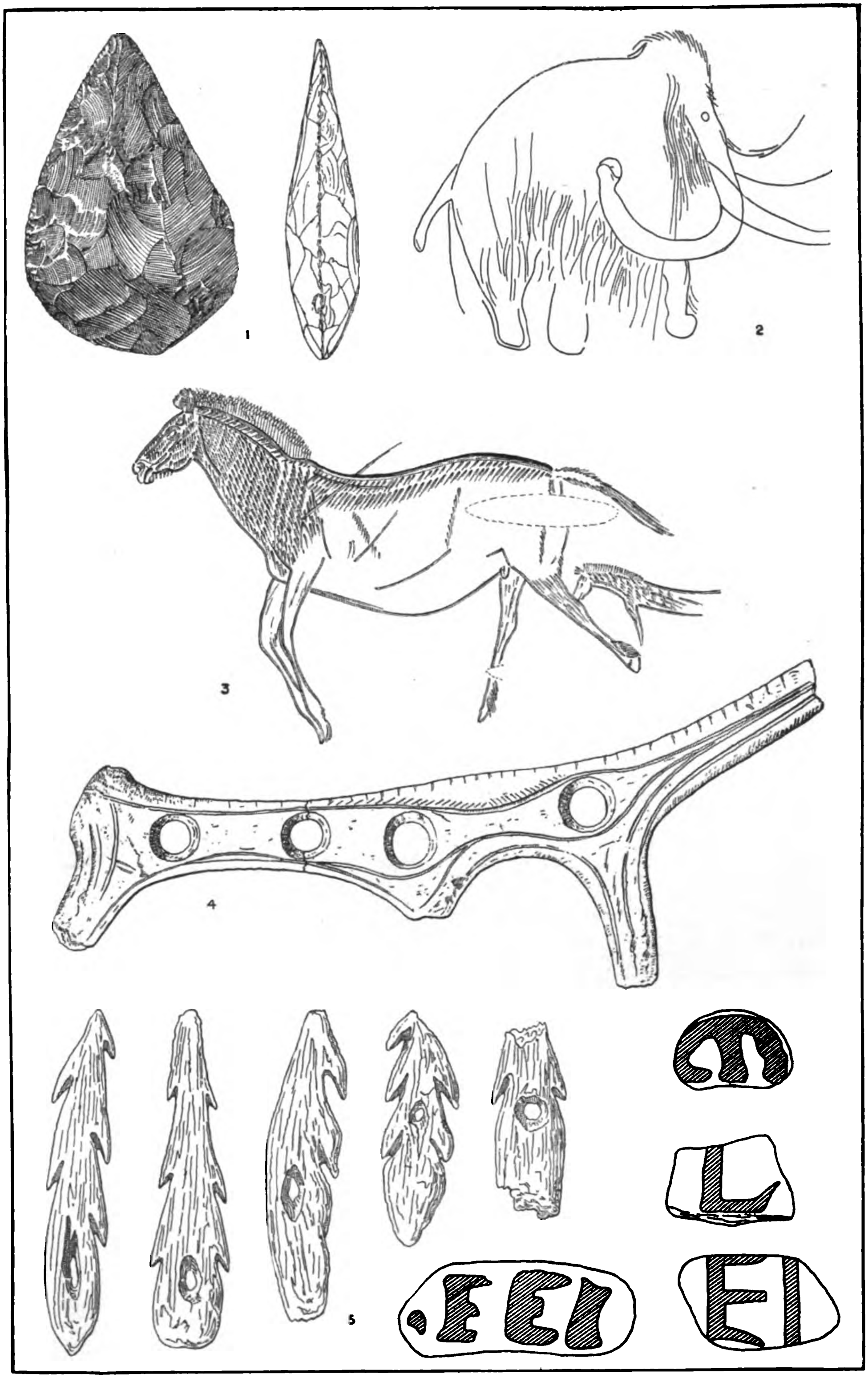
Aurignacian Epoch. It was reserved for the Abbé H. Breuil to differentiate and firmly establish this subdivision of the paleolithic period. The type station is the cave of Aurignac (Haute-Garonne), where industrial remains of the age and type in question were first reported by Lartet in 1861. The Aurignacian was the first great art epoch of Quaternary times. Then sculpture in the round and high relief flourished as they perhaps never did again, and the arts of engraving as well as drawing in color had their birth. A new race, the ancestry of which has not yet been definitely traced, supplanted completely the archaic Neanderthal race of Mousterian times. Like the latter, however, the Aurignacians were still hunters. Cave regions such as the Vézère valley, the Pyrenees and the Cantabrian mountains favored the increase of population and a more sedentary mode of life. In time this brought in its train a scarcity of game, hence the remarkable art development of that period. Nearly all the figures are of favorite game animals.

Aurignacian stone industry is characterized by the evolution of various tools and arms from bladelike flint flakes. The Acheulians took little trouble to prepare a nucleus from which to strike off chips. The Mousterians showed more skill in the preparation of nuclei. It was reserved for the Aurignacians to produce nuclei from which comparatively long blades could be struck. In passing from the lower through the middle and to the upper Aurignacian, marked differences are noted.

Early in the Aurignacian appear the Audi blades, followed by Châtelperron blades, carenate scrapers, and lateral gravers. New types in bone and ivory occur, including the Aurignac point either with or without a cleft base and the statuettes from Brassempouy (Landes). In the upper Aurignacian the Audi and Châtelperron blades give place to the Gravette point.

Sculptured representations of the human form have been found in widely separated stations—Grimaldi, Willendorf, and Laussel. To this phase belong the mural engravings at Gargas (Hautes-Pyrénées) and Hornos de la Peña,

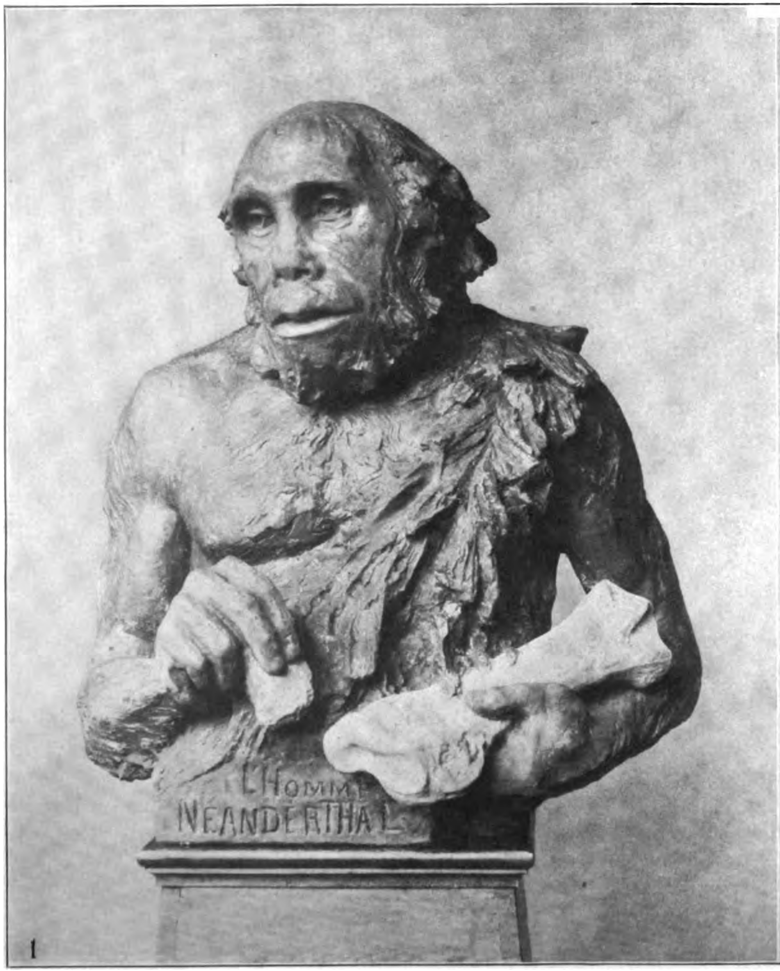
PALEOLITHIC PERIOD



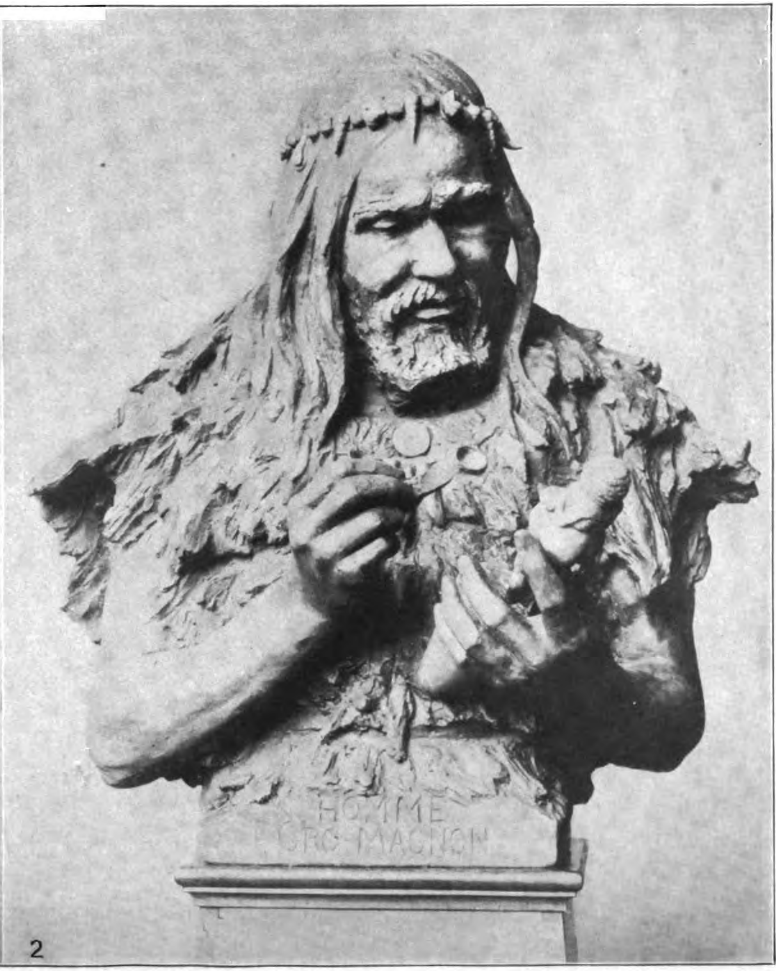
SPECIMENS OF PRIMITIVE CULTURE

1. Coup de poing. Acheulian Type. Front and Side Views
2. Engraving of a Mammoth. Cavern of Les Combarelles (Dordogne). Second Phase. (After Capitan and Breuil)
3. Engraving of a Horse. Detail from the ornamental stag horn prong found at Teyjat. (After Breuil)
4. Baton de Commandement, with four holes. Made of the shed antler of a young reindeer. La Madelaine (Dordogne). (After Lartet and Christy)
5. Specimens of Asylian Culture from the Cavern of Mos d'Azil (Ariège) Left, perforated harpoons of stag horn. Right, pebbles representing cursive system of writing

PALEOLITHIC PERIOD



1. MAN OF NEANDERTHAL (Reconstruction). Mousterian epoch After Rutot



2. MAN OF CRO-MAGNON (Reconstruction). Aurignacian epoch. After Rutot

Province of Santander, Spain. During the Aurignacian epoch the love of ornament developed in conjunction with the decorative arts in general, as is witnessed by the use of bone and ivory pendants, as well as perforated shells and animal teeth that served as necklaces, pendants, and trimmings.

The stratigraphic position of the Aurignacian culture is in the middle and upper portions of the recent loess which caps the third and fourth terraces in river valleys. The accompanying fauna includes the horse, bison, mammoth, woolly rhinoceros, stag, reindeer, cave bear, cave hyena, and wild boar.

Solutrean Epoch. The type station of this epoch is the *Cro du Charnier* at Solutré near Mâcon (Saône-et-Loire). The Solutrean deposit is beneath a layer of humus. In addition to artifacts it includes the bones of reindeer in large numbers; those of the horse, ox, deer, wolf, cave bear, cave hyena, and mammoth occur in lesser degree. Beneath the Solutrean layer is a magma of horse bones, many of them burnt. In this magma are represented the remains of at least 100,000 horses. Underneath this horse magma or breccia are two deposits of the preceding (Aurignacian) epoch.

The Aurignacians made great advances in the preparation of a flint nucleus from which to strike off comparatively long blades. The special contribution of the Solutreans was their ability to reduce a whole surface by means of well-directed retouches, a technique that reappears in a high degree of perfection during late neolithic times, especially in Egypt, Denmark, and the New World. At no other time during the paleolithic period did the art of shaping flint by chipping reach so high a stage. The lanceolate implement resembling in outline a laurel leaf and chipped on both sides to a remarkable thinness characterizes the lower half of the Solutrean epoch.

The flint point in shape like a willow leaf with the addition of a lateral notch at the base is characteristic of the upper Solutrean. Both horizons contain implements that appeared first in the Aurignacian and that are derived principally from bladelike flint flakes—end scrapers, gravers, drills, etc. Bone needles and batons of reindeer horn that appeared timidly in the Aurignacian are met with more frequently in Solutrean stations. To this epoch also belong some of the engravings and drawings on the walls of caverns.

The stratigraphic position of the Solutrean industry is in the upper weathered portion of the recent loess, known as brick earth. It is therefore often so near the surface as to be mixed with and mistaken for the industry of the neolithic period.

Magdalenian Epoch. This last of the epochs that might strictly be called paleolithic corresponds to the closing episode of Pleistocene times. The type station, a rock shelter, is near and derives its name from the ruins of La Madeleine, near Les Eyzies (Dordogne). Among the many important cave deposits belonging to this epoch are Langerie Basse (q.v.) and Grimaldi. The Magdalenians were evidently not so particular as were the Solutreans in the choice of the raw material for the manufacture of flint implements; these for the most part consist of end scrapers, drills, gravers, etc. On the other hand, undoubted progress is to be noted in the use of bone and reindeer horn as exemplified in the delicate bone needle with eye hole and the harpoon of bone and reindeer horn. The arts of engraving and fresco reach their apogee during this epoch. The harpoon furnishes a marvelous measure of the progressive steps in the industrial evolution of the time. In the early stages the barbs are small and numerous, suggesting the jaw of a fish, and the material employed was generally bone. Later a distinct change takes place. There is an enlargement near the base; the barbs are better defined and arranged in a single lateral row. Towards the close of the epoch the material used is largely reindeer horn and there are two rows of long sharp recurrent barbs. Synchronous with this last type of harpoon is the parrot-beak flint graver.

While the earliest spear throwers and perforated batons may have antedated the Magdalenian, many of the best examples belong undoubtedly to this epoch. The purposes served by the baton have been the subject of much conjecture: skull crusher, sceptre, magic wand, prototype of the safety pin, etc. It was perhaps nothing more than a straightener for shafts of arrows and javelins, since somewhat similar objects are used for this purpose by the Eskimo, and the Indians of North America. There is no longer any doubt concerning the identity and use of the so-called spear thrower. A splendid example of the spear thrower, carved in ivory and ornamented with a figure in the round of a game animal, was found at La Madeleine.

Dawn of Art. The first appearance of what might be called the decorative and even the fine arts is coincident with the appearance of the Aurignacian race. Paleolithic art objects may be classed under two heads, portable and stationary. The portable class is found in the floor accumulations of caves and rock shelters as well as in valley deposits. It consists in part of decorated tools, weapons, and ceremonial objects, the art playing perhaps a supplementary rôle to utility. It also includes engraved pebbles as well as carved fragments of stone, ivory, bone, and the horn of reindeer and stag, in fact almost anything that could be seized upon to satisfy the exuberant demands of the cave man's artistic impulse. The stationary works of art are those that embellish the walls and ceilings of caverns and rock shelters; in rare instances the clay of the cavern floor was utilized for modeling and sketching purposes.

Chiefly for two reasons it has been possible to trace the evolution of Quaternary mural art, viz., its relation to the floor deposits and the superposition of figures. The age of relic-bearing floor deposits is determinable by the relics themselves. It often happens that mural art is found to be covered by accumulations on the floor of the cavern. The mural art in such a case is older than the deposit which covers it. Thus, at Pair-non-Pair rude, deeply engraved, parietal figures were completely lost to view beneath deposits of upper Aurignacian age. The engravings are therefore anterior to the upper Aurignacian. They represent the first or oldest phase of engraving. At La Grèze a wall engraving was buried beneath a deposit of Solutrean age. It also belongs to the first phase. A mural fragment may become detached, fall to the floor, and be buried, thus approximately dating that which remains on the wall. Again, the similarity of art objects from the floor deposits to the mural art may serve to date the latter.

As to the superposition of parietal figures it is often very difficult to ascertain which is the older and which the younger, if both are incised. On the other hand, if one is incised and the other painted the problem is simple enough. Either the incised line cuts the painting or is filled by the color. In the first case the engraving is the younger, in the second the painting. The relation between superposed frescoes is likewise easily established. Thus has Breuil been able to trace the evolution of paleolithic mural art through at least four phases.

The first phase includes deeply incised figures generally in absolute profile, the outlines being rude, ill proportioned, and details such as hair and hoofs not indicated. The paintings of this stage are in outline black or red; there is absolutely no thought of modeling.

The incised figures of the second phase remain deep and broad, but the outlines are more lifelike, although not always well proportioned. All four of the legs are sometimes represented, likewise the hoofs. As the incisions become less deep they gain in neatness. In places the effect of bas-relief is produced by means of champlevé. The more hairy portions are indicated by incised lines. Engravings of this stage are especially well represented at Combarelles. The paintings of the second phase evince the first attempts at modeling by shading at certain points. Towards the close of this phase engraving is combined with painting, especially for the contours. The use of color continues to develop until one arrives at a well-modeled monochrome silhouette, usually in black.

The engravings of the third phase are generally of small dimensions but admirable in execution. The entire mural decorations in the cavern de la Marie at Teyjat are in this style. In the domain of painting this phase is characterized by an excessive use of color, filling completely the silhouette and producing a flat effect. The modeling that was such an attractive feature of the preceding stage is destroyed. The period is therefore one of regression in so far as painting is concerned. Black, red, or brown was used, and the drawing was frequently deplorable. As a rule these paintings are not well preserved. The best work is to be seen at Font-de-Gaume and is executed in black or brown. It is often combined with engraving of a high order done before the color was applied.

During the fourth phase the engravings lose in importance. The lines are broken and difficult to follow. The small figures of the mammoth at Font-de-Gaume and of the bison at Marsoulas show this tendency to emphasize detail at the expense of the ensemble. Paleolithic painting reaches its zenith in the fourth stage. The fresco is always accompanied by a foundation of engraving. The outlines are usually drawn in black, as are the eyes, horns, mane, and hoofs. The modeling is done with various shades produced by the mixing of yellow, red, brown, and black. These polychrome figures are seen at their best on the famous ceiling at Altamira, as well as at Font-de-Gaume and Marsoulas.

One of the striking features about paleolithic art is its realism. This is especially true of the phases leading to the period of its highest development. Recent investigations confirm in the main Piette's views as to the evolution of Quaternary art, although the successive stages overlap more than he had supposed. Sculpture appeared in the lower Aurignacian, but continued without interrruption through the Solutrean and to the middle of the Magdalenian—a much longer period than Piette had in mind. Although beginning but little earlier than engraving, sculpture came to full fruition first. Engraving, however, developed more slowly at first, not reaching its zenith till the middle Magdalenian, when it supplanted sculpture.

Among engraved and painted forms there is preponderance of profile figures. Combined with the artist's skill in handling animal profiles is his skill in executing profile figures that represent the model in a variety of attitudes—running, leaping, walking, standing, browsing, lowing, at rest, chewing the cud, rising from the ground, at bay, etc. By degrees the stiffness of the profile was overcome. The movement of the body and especially the legs in action are often portrayed with a fidelity that will even stand the test of comparison with a moving-picture film. The artist seems to have met in a most ingenious fashion the difficulty of giving to a motionless figure the effect of movement.

On the other hand, compositions in the true sense are rare. The placing of several figures in proximity often means nothing more than the desire to economize space. In addition figures are sometimes superposed, either unwittingly or otherwise. The most common forms of assembling related figures are the procession, the suggestion of a hunting scene, or a herd.

The animal figures were no doubt in a large measure votive offerings for the multiplication of game and success in the chase; hence the more realistic the figure the more potent its effect would be as a charm. The mural works of art—figures of male and female, scenes representing animals hunted or wounded—are generally tucked away in some hidden recess, which of itself is witness to their magic uses. Mythical representations, so common to modern primitive art and to post-Quaternary art in general, are foreign to paleolithic art; there were no gods, no figures with mixed attributes. The paleolithic artist left frescoes, engravings, bas-reliefs, and figures in the round of the horse, but there is not a single figure of a centaur.

The artist's tools were primitive. Flint scrapers and gravers were employed in preparing the surface and tracing outlines. The colors used by the Quaternary artist are oxides of iron and manganese. These minerals were pulverized, mixed with grease or other medium, and applied with a brush. Crayons of ochre or oxide of manganese were likewise employed. That paleolithic man came near to the discovery of the ceramic art is attested by the recent discovery of two bison figures modeled in clay.

Azilian Epoch. This epoch is, properly speaking, a transition stage between the paleolithic and the neolithic period (q.v.). Its name comes from the station of Mas d'Azil (Ariège). Azilian culture is associated with present-day fauna; it is marked by the absence of pottery as well as any evidence of the domestication of animals and plants. The distinguishing weapon is the flat harpoon of staghorn, of clumsy make and usually perforated near the base. In Azilian deposits occur those curiously painted pebbles that some prehistorians have interpreted as the first attempt at a system of cursive writing.

The chronological relations of these epochs were determined by the superpositions of deposits in the various caverns, and recently a cave was discovered at Castillo (or Castello) in Northern

Spain in which all of the known epochs were in place, thus giving definite proof for the preceding chronology.

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PALÉOLOGUE, pȧ'lā'ō'lŏg', MAURICE (1859–). A French diplomat and writer, born in Paris. He held various positions in the Ministry of Foreign Affairs and went on missions to Germany, China, Korea, Bulgaria, and other countries. He was created an Officer of the Legion of Honor. Paléologue's works, especially notable in the field of literary criticism, include: *L'Art chinois* (1888); *Vauvenargues* (1889), crowned by the French Academy; *Alfred de Vigny* (1892; 3d ed., 1908); *Profils de femmes* (1895); *Sur les ruines* (1897); *Le cilice* (1901); *Rome, impressions d'histoire et d'art* (1902), crowned by the Academy; *La cravache* (1904); *Le point d'honneur* (1907); *Dante, son caractère et son génie* (1909).

PA'LEONTOL'OGY (from Gk. *παλαιός, palaios*, ancient + *ὄντα, onta*, pl. of *ὤν, ὄn*, being + *-λογία, -logia*, from *λέγειν, legein*, to speak). The science which deals with the ancient life that has inhabited the earth during the past periods of geological time. It is based upon the study of fossils and has close affiliations with geology, physiography, and biology. It embraces, under a broad conception of its scope, not alone the description and classification of fossils, but also all questions relating to the nature, morphology and physiology, bionomy and ecology, geologic and geographic distribution, and to the ontogeny, evolution, and phylogeny of all forms of plant and animal life that have lived upon the earth and that are now found, in more or less well-preserved condition of fossilization, embedded in the rocks that form the earth's crust. Paleontology is the history of the organic life of the earth from its inception in remote geologic time to its culmination in the vegetable and animal life of the present era. This science was founded on an independent basis by Lamarck, Cuvier, Schlotheim, Sowerby, Parkinson, D'Orbigny, and Goldfuss about the beginning of the nineteenth century, and most of the early paleontological literature dealt with mere descriptions and classifications of fossils. After the publication of Darwin's *Origin of Species* in 1859, and the subsequent elaboration of the doctrine of evolution, it became evident that proof of this doctrine must be furnished largely by the paleontologists, and the study of fossil organisms received a new impetus along those lines of research which bear upon the broader philosophical questions of the origin, evolution, and phylogeny of the various species and races of fossil animals and plants. Quite coördinate with this development of the biological phase of paleontology has been the elaboration of that phase of the science which is more closely allied to geology, viz., the more refined methods in the use of fossils as markers of geologic horizons, the investigation of the succession, migration, and evolution of fossil faunas and floras, and the determination of the physiographic changes and other causes of such phenomena.

Two lines of paleontological research may then be recognized. Certain investigators confine their attention almost entirely to elucidation of the morphology, embryology, ontogeny or development, and phylogeny or genealogy, and to the description and classification of organic remains, noting the names only of the geological formations whence the species have been derived. Such studies fall within the scope of paleobotany and paleozoölogy, which are essentially branches of biology. The other phase of the science of paleontology, and perhaps the more comprehensive of the two, may be designated as paleontologic geology, stratigraphic paleontology, geological biology, and deals with the relations existing between the fossils and the rocks in which they are found. It is practically that part of historical geology which is based upon the study of fossils. Under this head are embraced the following lines of investigation and also others not mentioned that are of more special interest: (1) the use of index fossils as markers of geological formations and horizons; (2) the assemblage, within individual formations, of species and genera of fossil plants and animals to constitute paleofloras and paleofaunas and the study of the succession, migration, and evolution of these ancient floras and faunas and their relations to the grander divisions of geologic time; (3) the development of facies and the influence of the facies on the conditions of existence of the life of ancient times; (4) the study of paleogeography, comprising the determination of the physiographic and climatic conditions existent during the successive periods of the earth's history. All these latter lines of investigation, however closely related in their final results to the physical side of geology, nevertheless depend for their successful pursuit upon intimate knowledge of the purely biological aspects of paleontology, for they are based primarily upon keen discrimination between allied species and upon recognition of the phylogenetic relationships of the species involved.

Fossils. The nature of fossils and the modes of fossilization are described in the article FOSSIL. Not all animals and plants of past time have been preserved to us as fossils. A large number of them were of such organization that they were hardly likely to leave traces of their existence in the rocks. It is also known that many formations which originally contained fossils have suffered so great metamorphism that their organic contents have been wholly or partially destroyed. Other formations have been upheaved above the level of the ocean to form part of the land and have been subjected to erosion, with the result that their materials have been carried down to lower levels or into the sea, there to build up deposits of later age. Yet, in spite of the many gaps which will probably never be filled, the history of organisms is being rapidly compiled with an increasing degree of continuity in the series of life epochs, the lines of descent of many races of animals and plants have been established, and the sequence of those events in geological history that bear upon the conditions of existence of extinct faunas has been worked out for several portions of the earth's surface and with a surprising degree of detail.

Through observation of the true order of superposition the rocks of the earth's crust have been arranged by geologists into a series of systems, stages, and formations, the lowermost being the oldest and the uppermost the youngest, and the relative succession of the individual members of this series has been determined to be the same in all parts of the world. The fossils of the different members of the series have been studied and described, and it has been ascertained that the assemblage of fossils found in one formation always differs more or less from the assemblage of fossils found in the overlying and underlying beds, and furthermore that the difference is accentuated as the distance between the formations is increased. For table of geological formations, see GEOLOGY.

Faunas. The fossils contained in a rock formation are in general indicative of the animal and vegetable life that lived during the period of time in which that rock was deposited. Successive faunas and floras of variable expression have succeeded each other on the earth and have left their remains in the rocks that were forming during the periods of their existence. The large divisions of time are distinguished by the predominant types of life, as the Paleozoic era by invertebrates, the Mesozoic era by reptiles, etc., and the smaller periods of time, represented by the stages and substages, are characterized by particular genera and species. Thus, the Helderbergian series is identifiable by the brachiopod genus *Gypidula*, and a division of that series, the Coeymans limestone, is recognizable by the presence of *Gypidula galeata*, a well-marked species that serves for the identification of that horizon in many parts of America. Such a characteristic genus or species, which can be relied upon for the recognition of geological horizons or zones, is called an index fossil, and its use is the result primarily of careful observation in the field. This empirical usage of index fossils is that adopted by geologists who have not been trained in the methods of paleontological research. There is a second and more important usage of index fossils based upon a knowledge of the phylogeny of races of animals and plants. By recognition of the phyletic position of a fossil the expert paleontologist can determine within close limits the relative age of the rock from which the fossil was obtained.

Indigene and Exotic Faunas. In a single basin it is sometimes found that a series of similar faunas, evidently evolved each from its predecessor in this basin, is eventually succeeded at a higher horizon by a new fauna totally different from those below. The lower faunas are the indigene faunas, developed or evolved in this province through a long period of time and consisting of members nicely adapted to their environment and to each other. The new fauna, generally associated with a change of sedimentation, is called an alien or exotic fauna, and it has invaded this region in consequence of physiographic or climatic changes. It may find itself in congenial surroundings, and its species will then multiply and evolve, and if left undisturbed it will in turn become the indigene fauna of the region. But if its new environment happens to become uncongenial it may suffer partial extinction of its members or suppression of development of its individuals, and it will remain in the region for a short time only, to be succeeded by another alien fauna or by a returning party of the original indigene fauna. The migrations of faunas are largely due to changes in the facies consequent upon physiographic and climatic changes.

Facies Development and Bionomy. Facies is the combination of physical and biological characteristics exhibited by a geological formation at a particular point. These are determined at the present time by climate, depth, tides, nature of medium, distance from shore, etc. (see DISTRIBUTION OF ANIMALS; ECOLOGY; FAUNA; FLORA), and just as different types of facies are being developed in the ocean and on the land at the present time, so they have been developed during all past periods of geological history. It follows, then, that the deposits formed during any one period may be represented in different regions by littoral, sublittoral, abyssal, corallic, estuarine, lacustrine, or terrestrial facies, and each of these facies will have its own distinctive fauna. Study of the life habits of modern organisms enables us to restore the habits of extinct forms of life, and we are able to portray with a considerable degree of correctness the conditions under which the ancient faunas lived and consequently also to picture the physiography of past times. The large majority of fossiliferous rocks are of marine origin, and hence a study of modern marine organisms is essential to a proper understanding of the bionomic conditions of the past. Fresh-water and terrestrial deposits are also claiming more attention than they formerly received; they with their peculiar faunas and floras occur chiefly in the Mesozoic and Cenozoic formations.

Bionomy. Marine organisms are broadly divided into pelagic, or those that inhabit the open sea, and littoral, those that live in the vicinity of the coasts. According to their modes of life they are divided into plankton, nekton, benthos.

Plankton includes the majority of pelagic organisms that are more or less passively drifted about by the waves and currents of the ocean. Many organisms are planktonic only during their larval stages and when adult become attached and adopt a benthonic life (meroplankton). Such are sponges, medusæ, annelids, echinoderms, brachiopods, bryozoans, most mollusks, and Crustacea. Others are planktonic throughout their lives, as Foraminifera, Radiolaria, Siphonophora, Ctenophora, Chætognatha, Pteropoda, Heteropoda, and some crustaceans. Planktonic organisms are generally widely distributed and their fossil remains occur principally in the sublittoral and abyssal facies, though they may be found in the littoral facies. See PLANKTON.

Nekton includes the organisms that are active swimmers independent of storms, currents, and tides. Here are included fishes, most malacostracan crustaceans, the dibranchiate cephalopods, and also the marine reptiles, including the extinct ichthyosaurs, plesiosaurs, Pythonomorpha, and the cetaceans.

Benthos includes all forms which live at the bottom, and of which there are recognized two subgroups, the sessile and the vagile benthos. The benthos includes by far the larger proportion of marine organisms that are found in a fossil state. Among them are the marine algæ, some foraminifers, sponges, hydroids, corals, echinoderms, worms, brachiopods, bryozoans, gastropods, lamellibranchs, cirripedes, tunicates, and many cephalopods, such as the orthoceratites and belemnites. Radial symmetry is most highly developed in the sessile benthos (corals and echinoderms). See BENTHOS.

Littoral Facies includes deposits formed on the beach and in the shallow sea in the vicinity of the coast. They consist mostly of terrigenous materials ranging in size from fine mud, through sand to coarse conglomerate, and some kinds of organic deposits. The coarse beds contain few fossils, but those of finer grain abound in them. Fossils of the littoral facies comprise remains of the organisms that inhabited the shallow water and the region between tides, also those of the beach and others that have drifted in to shore from the open sea. The majority of the fauna is made up of benthonic forms, and all the animals and many of the plants have strong calcareous skeletons. Certain types of mollusks are characteristic of the littoral zone—oysters, mussels, the heavy clams, limpets, chitons, Littorina-like shells, the boring lamellibranchs—and here belong also the coarse marine algæ, crabs, and anomurans. The littoral facies is the most important of all, for most of the fossiliferous rocks have been formed in the shallow water near the shore and on the continental shelf, and also because preëminently, in its peculiar development of corallic facies, it contains the largest fauna.

Sublittoral Facies includes those deposits formed in the deeper water at a distance from the coast. It merges on the one side into the littoral and on the other into the abyssal facies. It contains the remains of pelagic (plankton and nekton) organisms which after death have sunk to the bottom, and also of those benthonic organisms of the deeper waters. Here are included fish, ammonoids, pteropods, graptolites, many foraminifers, radiolarians, and many echinoderms, mollusks, and brachiopods of more delicate build than those found in the littoral facies. Many of the pelagic organisms enjoyed very wide distribution, as the graptolites, and hence afford excellent index fossils for correlative purposes. Examples of sublittoral facies are the graptolite shales of the Ordovician, goniatite, and ammonite limestones and shales of the Upper Paleozoic and Mesozoic, and many pteropod limestones, like the Styliolina limestone of the Devonian.

Abyssal Facies. Here are included the deposits of the deep sea, consisting of very fine grain sediments of various types. (See OOZE.) The existence of abyssal sediments among the rocks of the earth's crust has been strongly denied by some writers. It is, however, difficult to assign certain geological formations to any other category. Such are the chalk deposits of the Cretaceous, the Upper Paleozoic radiolarian cherts of New South Wales and those of Jurassic age in the Alps, and the aptychus shales of the Alps, all of which are very similar to the abyssal deposits of the present day.

Corallic Facies. This is really a phase of the littoral facies, but as its characteristics are so distinct and as its development depends upon the absence of many of those features associated with the normal littoral facies, it deserves special consideration. The conditions under which corals form reefs at the present time are a warm temperature, shallow water not more than 125 feet deep, and pure sea water entirely free from mud and from inflowing fresh water. The other organisms living about the coral reef require the same conditions. These conditions existed also during the formation of the Paleozoic and Mesozoic and Tertiary coral reefs, for the rocks of these fossil reefs are free from traces of mud and clay.

Estuarine Facies embraces the deposits and faunas of lagoons and estuaries. The sediments are usually irregularly bedded muddy sands and clays. Here is found a commingling of brackish-water types with marine organisms, fresh-water and terrestrial types. A fine example of such an estuarine facies is afforded by the Lower Carboniferous nodule-bearing shales of Mazon Creek, near Morris, Ill., described by Meek and Worthen, Scudder, and others. The nodules have furnished a very large congeries of plants and animals. There are represented here ferns, amphibians, fish, insects, spiders, scorpions, myriapods, eurypterids, crustaceans, aquatic worms, lamellibranchs of marine and fresh-water types, gastropods of fresh-water, marine, and terrestrial types. No strictly marine types, like crinoids and brachiopods, occur here, those present being species which could live in brackish water. Other examples of estuarine facies are found in the Carboniferous, Mesozoic, and Tertiary formations of Europe. In all probability many of the coal-measure swamps were of estuarine nature, for sections through the beds show alternations of marine and fresh or brackish water faunas.

Fresh-Water Facies appears first in the Carboniferous in the form of swamp deposits, now turned into coal. In these deposits are abundant fossil plants of various types and remains of fresh-water mollusks, insects, etc., and also of amphibians and fish. In the Mesozoic, and in more pronounced degree in the Tertiary, lacustrine deposits are largely developed. They may be recognized by their contained fresh-water shells: *Paludina*, *Gioniobasis*, *Planorbis*, *Limnæa*, *Unio*, and *Anodonta*. They have afforded also the far more important and more interesting vertebrate remains, such as the dinosaurs, birds, and mammals. *Terrestrial facies*, represented by deposits of flood plain, desert, and prairie, do not as a rule afford many fossil remains. The loess, a recent accumulation of dust and river mud, contains land and fresh-water shells, and the White River Miocene clays of Colorado, containing finely preserved vertebrates, are thought to have been accumulated largely as dust upon a Tertiary prairie.

Composite Facies. The fossil elements of a fauna may be distinguished as autochthonous, or those which naturally belong in the deposits where found and which have been buried where they lived or where they fell to the bottom, and heterochthonous, or those which owe their entombment to the agencies of currents or other means of transportation and have been buried far from their natural habitats. The autochthonous fossils are the more reliable for zonal correlation, while the heterochthonous fossils indicate the nature of preëxistent faunas and the proximity of neighboring faunas of different facies.

Ancient Climate and Paleogeography. Climatic zones are thought to have existed as early as Cambrian time and to have continued through the Silurian and Devonian periods. The European and North American faunas of these periods can be separated into northern and southern types which are quite distinct, the various genera having representative species in each zone. The courses of oceanic currents have been indicated for the early and late Ordovician by Matthew and Ruedemann. Other evidence regarding the climate of the Paleozoic is derived from study of the distribution of the fossil coral reefs of the Silurian and of the plants of the Carboniferous. The Silurian coral reefs are found in high latitudes and indicate rather warm temperatures for those regions, and the structure of the Carboniferous tree trunks points to a remarkable uniformity of the seasons during that period. Neumayr has tried to demonstrate that the Jurassic and Cretaceous faunas show the influence of well-marked climatic zones which extended in belts around the globe independent of the continental barriers, but his results have not been confirmed by subsequent investigations. During the Tertiary, however, climatic zones certainly existed, as is indicated by the fossil floras and faunas, but a lowering of the temperature began during Eocene time in North America and during Miocene time in Europe, and culminated in the Ice age of the Pleistocene. Various interesting attempts have been made by Neumayr, Suess, Chamberlin, and others to correlate the evolution of animals and plants with the changes of climate in past times.

It will be seen from what has been said regarding facies development that the study of the distribution and migration of fossil faunas leads to conclusions regarding the physical geography, paleogeography, of ancient times; these conclusions must of course be tested in the light of the evidence derived from the study of the tectonic features. Much has been accomplished in this field of research by Heer, Neumayr, Suess, De Lapparent, Canu, Smith, Chamberlin, Weller, Ortmann, Schuchert, Ulrich, and Clarke.

It is especially zoögeography, or the science of present animal distribution, which finds in paleogeography and the tracing of migrations in the past its sure foundation. Barrande's doctrine of the centres of origin, or the geographic regions where the chief characters of great groups were established, has been especially fruitful in this field. Many authors, notably Hyatt and Ortmann for the invertebrates, and Osborn, Depéret, Matthew, and Stehlin for the vertebrates, have applied the doctrine with signal success to paleogeographic studies and established many centres of origin and lines of migration.

Species and Genus in Paleontology. The early conceptions of species held by the botanists and zoölogists of the nontransformist school were held also by paleontologists. Each fossil species was considered to represent a distinct entity separate from its allies and specially created. At that time transitional forms between species were grouped as varieties under one or the other specific head, or were even in many cases thrown away and destroyed, as they interfered with the hard and fast delimitations sought after in the early classifications. Subsequently, as the evolution doctrine became better understood, these transitional individuals were recognized as affording examples of the variability of species, and they are now considered to be of equal importance with the norm of the species itself, as affording evidence upon the origin of new varieties. A fossil species differs from a living species in one important respect. The living species of the present day is distinguished by certain particular characters which differentiate it from its allies, certain physiological tests determine its individuality, and it has a more or less limited area of geographical distribution. The species of the paleontologist is a far different conception. In addition to its geographical distribution it has geologic range, for it lived during the period of deposition of perhaps several successive formations, and it is represented in these formations by a series of fossil forms of more or less unmistakable continuity until it disappears at some higher horizon. The physiological tests are impossible, and hence the paleontologist must rely upon likeness of form and upon continuity of occurrence, and he groups under a single specific denomination those individuals which resemble each other in essential characters and which differ only in secondary characters. Some species were evidently very short-lived, others enjoyed long lives and underwent little if any change of form, while still others varied considerably during their periods of existence, and in their later stages present such wide departure from the original form that, were the intermediate transitory phases absent, they would be considered as constituting distinct species or perhaps even distinct genera. Examples of such series of variable species are furnished by the *Planorbis* of the Upper Miocene at Steinheim, Württemberg, described by Hyatt and Hilgendorff; the *Paludinas* of the Lower Pliocene of Slavonia, described by Neumayr; the *Ammonites* of the *Oppelia subradiata* type of the Jurassic limestones, studied by Waagen.

The existence of such series of transitional forms, the members of which occur in successive horizons and all of which have apparently been derived from an original common ancestor, forces recognition of the fact that the term "species" in paleontology is a very arbitrary one, and that the limitation of a species is determined, not by any strictly definable form, but rather by the absence of transitional forms that would serve to link it through scarcely distinguishable grades of variation to its nearest ally. Two species found in formations of different ages and now considered distinct may through future discovery of intermediate transitional stages prove to be but the earliest and latest stages of a single race. The same principles are true in respect of genera, families, etc. (see HORSE, FOSSIL), our conceptions of which change as intermediate forms are discovered and as the gaps in the classification are filled up. The inevitable conclusion drawn is that species and genera and even the larger groups are mere stages in the life history of organisms, that they have no real existence in nature, and that they are arbitrary concepts of the stages of evolution attained by a race of organisms at a particular moment or during a more extended period of its history.

Persistent and Aberrant Types. Persistent or conservative types are common among fossils, and they include those types that have escaped all changes of environment and also those members of an original stock which have not responded to the influences of changed environments and which have perpetuated the characters of their more primitive ancestral type through several geological formations or epochs. Examples are found among the Foraminifera, *Globigerina* and *Orbulina* (Cambrian to recent); *Nautilus* among cephalopods (Ordovician to recent); *Lingula*, *Crania*, and *Rhynchonella* among brachiopods; and *Cidaris* among echinoderms.

Aberrant types, or forms in which organs have been developed to an extent not found in the other normal members of the group, are common among fossils. *Eucalyptocrinus* among crinoids, the Rudistæ, Pholadidæ, and Teredinidæ among pelecypods, *Ampyx* among trilobites, *Triceratops* and *Naosaurus* among reptiles, and the titanotheres among mammals, serve as examples. The most aberrant forms are usually found at the ends of short lines of descent, and they seem to mark approaching extinction of these side lines. They seem to indicate extreme adaptation of the organism to special modes of life and appear to have lost their powers of adaptation in other directions.

Generalized and Synthetic Types. In the early history of the subkingdom there is often found to be a group of fossil organisms which combine in more or less marked degree the characters that distinguish a number of distinct classes or orders of later date. Such a generalized type or synthetic group is considered to resemble closely if not actually to represent the ancestral type of the entire subkingdom. An excellent example is afforded by the Cystoidea of Cambrian and Ordovician origin, which combine the characters of the Crinoidea, Blastoidea, Asteroidea, and Echinoidea of later origin. (See CYSTOIDEA; CRINOIDEA.) At a date after the Cystoidea and Blastoidea had become extinct, and after the Echinoidea had passed through a considerable amount of evolution there appeared in the Triassic the isolated genus *Tiarechinus*, which resembles both the Blastoidea and the Echinoidea and which thus constitutes a synthetic type between these two classes. The Phyllocarida form a generalized group connecting the Entomostraca and Malacostraca; the Merostomata, containing the Eurypteridæ and Limulidæ, connect the Crustacea and Arachnida (especially the scorpions); the suborder Condylarthra of Lower Eocene time contains the ancestors of all the later suborders of the Ungulata and also presents characters resembling those of the Carnivora; and the Gnetaceæ are synthetic between the angiosperms and gymnosperms. Nearly all races of fossil animals that can be traced back through ancestral forms are found to have their origin in such groups of generalized types.

Paleontology and Evolution. The causes of variability among species, the meaning and processes of evolution and natural selection, and the relations between evolution and classification are considered in other articles under those particular titles. The bearing of paleontologic research upon these subjects and some of the results attained deserve brief notice here, and for further information regarding these lines of research the reader is referred to the papers cited in the bibliography at the end of this article. The following lines of research have been distinguished: auxology or bathmology, the study of growth of organisms; genesiology, the study of heredity; ctetology, relating to the origin of acquired characteristics; and bioplastology, dealing with the correlation of the ontogeny and phylogeny, or the stages of development with those of evolution.

Embryogeny of Fossil Organisms. Embryonic shells of mollusks, brachiopods, and crustaceans are sometimes found as minute objects in highly fossiliferous shales and limestone. Some adult shells retain at their apices the form of the embryonic shell, and others, like the ammonites, have the young shell which hatched from the egg inclosed within the centre of their coiled disks. By examining large numbers of brachiopod shells of all sizes Beecher and Clarke, and later Schuchert, were able to arrange the individuals of certain species in series according to size and to show that they all were derived from an embryonic stage, called the protegulum, of very simple form, resembling the Cambrian genus *Paterina*. They have shown that members of all the families of brachiopods began their existence as paterina-like shells, and that the distinctive adult shapes have been attained through modifications in the mode of growth of the shell during the stages subsequent to the protegulum stage. Beecher has shown that members of the principal families of trilobites began their existence as embryonic forms, called the protaspis, which is comparable with the protonauplius stage of the more primitive living crustacea. Among the corals several fossil genera, as *Favosites*, *Syringopora*, etc. (see Beecher and Girty), pass through an embryonic stage that resembles another fossil coral *Aulopora*. The nautiloid and ammonoid cephalopods present the most favorable conditions for the preservation of the embryonic stages of growth, because their shells hold within their centres all the successive stages through which they have passed in their ontogenetic development. By breaking open such a shell the developmental stages can be studied from the earliest protoconch hatched from the egg and found at the centre of the coil to the senile or old-age stage represented by the last chamber in which the animal lived. See CEPHALOPODA.

Agassiz's Law of Recapitulation, subsequently termed by Haeckel the law of palingenesis, according to which the stages of development or ontogeny of the individual can be correlated with the stages of evolution or phylogeny of the race to which the particular individual belongs, has received abundant confirmative evidence from paleontology, and the literature on this and allied branches of research is quite formidable, especially in its technicality of expression. The following scheme of terms adapted from Hyatt has been devised to distinguish the corresponding stages.

ONTOGENY, OR DEVELOPMENT		Phylogeny, or evolution of race stages	
Colloquial	*Technical*		
Fœtal	Embryonic	Phylembryonic	Epacme
Baby	Nepionic	Phylonepionic	
Adolescent	Neanic	Phyloneanic	
Adult	Ephebic	Phylephebic	Acme
Senile	Gerontic	Phylogerontic	Paracme

Fine illustrations of such correlations between ontogenetic and phylogenetic stages have been furnished by Hyatt's study of the Arietidæ, a group of ammonites; by Beecher's demonstration of the phylogeny of the Terebratellidæ, a family of brachiopods; and by Beecher's studies on the larval forms of trilobites. Colonial stocks of graptolites and bryozoans have likewise been found by Ruedemann and Cumings to pass like individuals through ontogenetic stages (astogenetic series). This palingenetic law is of much value to the stratigraphic paleontologist, for it enables him to correlate geological formations of which the faunas consist of wholly unknown species. It also enables him to postulate the existence in earlier formations of unknown genera which when found will prove to be counterparts of larval or adolescent stages of species already under observation.

Acceleration and Retardation. In some cases the correspondence between the two classes of stages mentioned above is incomplete, through action of tachygenesis, or acceleration of development, which has been defined by Hyatt as follows: "All modifications and variations in progressive series tend to appear first in the adolescent or adult stages of growth and then to be inherited in successive descendants at earlier and earlier stages according to the law of acceleration, until they either become embryonic or are crowded out of the organization and replaced in the development by characteristics of later origin." Examples are seen in the spiny larvæ of the trilobites *Acidaspis* and *Arges*, which differ greatly from the smooth protaspis stages of other trilobites. Retardation of development is the reverse of acceleration and is due to the later stages dropping out of the ontogeny; in other words, animals in which this operates grow old quickly. Examples are afforded by some Cretaceous ammonites which have sutures of goniatitic and ceratitic type. These ammonites are derived from Jurassic ancestors having complex sutures, but they never attained their normal development; they stopped growing in their youth. Similar cases have been noted among the brachiopods, and the larval condition of many parasites may be explained in this manner. Retardation of acceleration results often in regressive evolution. These laws of acceleration and retardation explain disturbing factors in the application of embryogenic methods to elucidation of the past histories of the races of modern animals and enable us to understand why the ontogeny of a living animal cannot always be depended upon to furnish a synopsis of the sequence of events that have occurred in the geological history of its phylum.

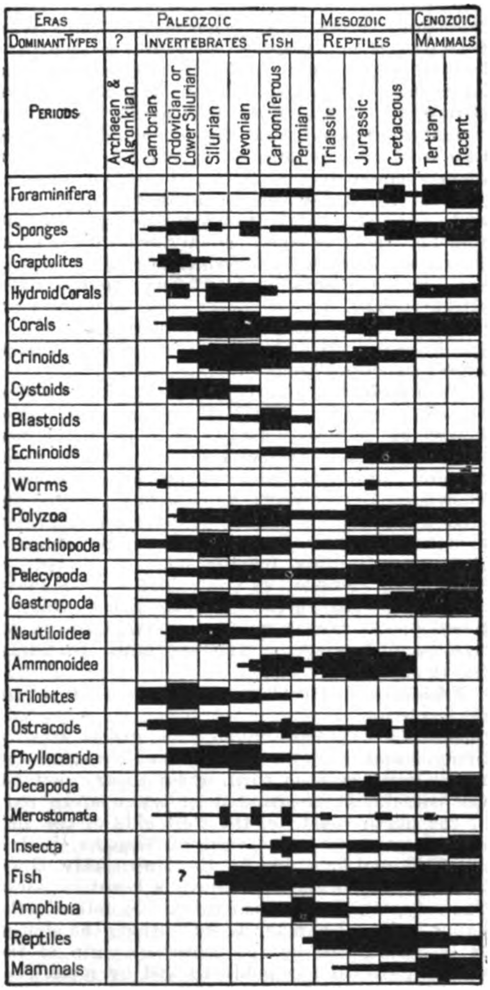
Ctetology (from Gk. *κτητός, ktētos*, acquired). The question of the inheritance of acquired characters, one of the cardinal principles of evolution, has been denied by some zoölogists and affirmed by most paleontologists. Hyatt, after tracing the genetic relations of varieties and species of fossil cephalopods through geologic time, came to the conclusion "that there is no class of characteristics which may be described as non-inheritable," and he has proved beyond any doubt the inheritance of one particular characteristic, viz., the so-called impressed zone, of the nautiloids, due to the adoption by the animal of a crawling mode of life, with its consequent influence upon the form of the shell. This impressed zone appeared first in the adult stages of early Paleozoic nautiloids, and through inheritance and acceleration it became fixed in successively earlier stages of growth in the succeeding nautiloids of the later Paleozoic.

Gerons and Phylogerons. When an organism has passed the acme of its development and begins to get old it sometimes acquires at that late date peculiar characteristics that seem to indicate loss of energy. The shells of mollusks and brachiopods thicken and the ornamentation decreases in prominence, etc. Among fossil cephalopods the last whorl often shows a tendency to uncoil. By acceleration these gerontic characters appear earlier in the ontogeny of succeeding species, and finally the normal closely coiled shell is found only in the very youngest stages of the phylogerontic members of the race.

Adaptation and Specialization. The manner in which many types of modern organisms have become adapted to their particular modes of existence is often well illustrated by their fossil ancestors, in which may be observed a gradual change in organization from earlier less specialized and less adapted types. One of the best-known cases of gradual adaptation is that of the horse, whose one-toed hoof has become adapted from an original five-toed Eocene ancestor of generalized type. (See HORSE, FOSSIL.) Some cases of adaptation to particular modes of existence reached a higher degree of perfection during past times than any known at the present day. There was a winged reptile, *Ornithostoma* or *Pteranodon* of the Cretaceous, in comparison with which the best of modern birds are mere tyros. This creature, with a body weighing not more than 30 pounds, had wings that spread 20 feet from tip to tip, and a skeleton so delicate that the bones are almost paper-like in structure. The cause of extinction of such a creature, which would seem to have been almost beyond the influences which are known to have caused the extinction of other races of animals, is as yet a mystery.

Recent studies of vertebrate adaptation have shown that there can be traced certain adaptations to repeated alternations of habitat. In such complicated cases it has been found that in secondary returns to primary phases lost organs are never recovered, but new organs are acquired. In many instances, especially among extinct Tertiary mammals, various adaptations for better securing food, escaping enemies, etc., are seen to proceed like radii from the stem forms ("adaptive radiation of groups" of Osborn), and general centres of radiation have been established, as the marsupial radiation of Australia, a Tertiary placental radiation in the Southern Hemisphere and another in South America. Besides these large radiations there occur also adaptive local radiations, where remains of a number of genetic series of the same groups are found in the same geological deposit. The investigation of the lines of adaptive radiation has clearly established the law of polyphyletic evolution, first demonstrated by Neumayr in regard to the ammonite genus *Phylloceras*. It has been shown that many apparently homogeneous larger groups, genera, and even species are composites of many distinct lines of evolution. Thus, the well-known graptolite genera *Dichograptus*, *Tetragraptus*, and *Didymograptus*, which follow each other in regular succession, are composed of different phyla or race lines.

Extinction of Organisms. One of the most impressive phenomena brought to the attention of the student of paleontology is the extinction or disappearance of species, families, and even whole orders, as well as faunas, of fossil animals and plants. In some cases the rate of disappearance is gradual, the group diminishing in importance before final extinction occurs; in other cases extinction is sudden, as if due to some catastrophe. Extinctions of the latter type are usually associated with important changes in the sediments or with unconformities, and occur at levels which have been used to mark the limits of geological systems or formations. In many cases such extinction is only apparent and is due to migration of the fauna into some distant or unknown region. In some cases the extinction is very real, entire groups of animals having been, as it were, suddenly annihilated. Some types of organisms after having enjoyed a more or less extended period of life have slowly died out and have become extinct, apparently uninfluenced by any physiographic catastrophe, after having passed through a maximum period of evolution and a subsequent phylogerontic decline. They have grown old and died apparently through lack of growth force. Without doubt the most far-reaching causes of extinction of marine animals during past times have been those changes in the relative levels of land and sea by which the water has been largely drawn off from the epicontinental shallow seas and from the continental shelf or littoral zone during intervals of isostatic readjustment. As a consequence of such readjustments, which also mark the openings of new geological periods, the faunas inhabiting the shallow seas have been driven into deeper water and have suffered annihilation, with the exception of scattered parties which found shelter in some harbors of refuge and thus served to furnish the nuclei for new faunas which evolved under future more favorable conditions.



DISTRIBUTION OF IMPORTANT GROUPS OF FOSSIL ANIMALS.

Among vertebrates Osborn recognizes as principal causes of extinction: first, internal causes found in exaggeration of body size; in the hypertrophy and overspecialization of certain organs, as horns and tusks; the evolution of relatively inadaptive types of tooth and foot structure, as in the gigantic edentata of South America; in the irreversibility of evolution; and possibly also in a progressive reduction of variability; and, second, external causes, as physiographic and climatic changes; evolution of insect life; introduction of carnivora; food competition, especially on islands. In short, there exists an almost infinite variety of interacting causes.

Distribution of Organisms in the Past. Detailed information regarding the range of the various fossil animals throughout the geological formations is given in the articles on the separate groups and genera, and the range of fossil plants is described in the article PALEOBOTANY. It is necessary here to give only a general view of the distribution of those groups of animals which are of most importance to the student of stratigraphic paleontology. The vertical divisions of the table represent geological periods, and the thickness of the black lines indicates the relative expansion of the groups. The selection of the group names is based entirely upon their importance as fossils and has nothing to do with their rank as members of a zoölogical classification.

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See the following articles: BIOLOGY; BOTANY; CLASSIFICATION OF ANIMALS; DISTRIBUTION OF ANIMALS; ECOLOGY; EVOLUTION; GEOLOGY; HEREDITY; NEO-LAMARCKISM; OCEANOGRAPHY; PALEOBOTANY; ETC.

PA′LEOTROP′ICAL, or ETHIOPIAN, REGION (from Gk. παλαιός, *palaios*, ancient + Eng. *tropical*). 1. A grand division in zoögeography composed of Africa south of the Sahara and Madagascar. The second name is the better, because only a part of the tropical regions of the Old World is included. Four subregions were delimited by Sclater and Wallace: (1) that part of Africa north of the tropic of Capricorn as far as the tropic of Cancer (including southern Arabia), except the Congo basin; (2) west Africa, or the equatorial Congo forest region; (3) South Africa; (4) Madagascar and the neighboring islands. This is one of the best defined of the zoölogical regions, and has been excepted by those who would unite all the rest of the Southern Hemisphere. (See NOTOGÆA.) Of its subdivisions the most clearly defined is the Malagasy subregion (q.v.). For the faunal characteristics of this region, see AFRICA, *Fauna;* also DISTRIBUTION OF ANIMALS.

2. In phytogeography a similar division of the first order is recognized and is made to include, however, not only tropical Africa and Madagascar, but also tropical Asia and Australasia. The principal divisions, as they are usually recognized, are: (1) the Sahara and Arabian desert region; (2) tropical Africa from the Sahara to and including the Congo region; (3) the South African region, extending to the Cape; (4) the Malagasy region; (5) the Indo-Malay region, including the Philippine Islands; (6) the Australian region, including Tasmania; and (7) the Polynesian-New Zealand region. Each of these is again subdivided into several provinces, differing somewhat according to the various viewpoints of plant geographers. See DISTRIBUTION OF PLANTS; PHYTOGEOGRAPHY. Consult Adolf Engler, *Entwicklungsgeschichte der Pflanzenwelt* (Leipzig, 1879), and O. Drude, *Pflanzengeographie* (Stuttgart, 1890).

PA′LEOZO′IC (from Gk. παλαιός, *palaios*, ancient + ζωή, *zōē*, life). The name given to the lowest of the three great divisions of the fossiliferous rocks because they contain the most ancient forms of life. They were formerly known as the primary rocks. The systems included under this title are the Cambrian, Ordovician, Silurian, Devonian, Carboniferous, and Permian. Phillips, for the sake of uniformity, introduced Mesozoic as equivalent to Secondary and Neozoic to Tertiary rocks. See CAMBRIAN SYSTEM; CARBONIFEROUS SYSTEM; DEVONIAN SYSTEM; GEOLOGY; PALEONTOLOGY; SILURIAN SYSTEM.

PALERME, GUILLAUME DE. See GUILLAUME DE PALERME.

PALERMO, pȧ-lĕr′mō. The largest city of Sicily, capital of the Province of Palermo and the judicial, ecclesiastical, and military seat for the island. It is situated in the western part of the north coast, on the west side of the Bay of Palermo, 120 miles west of Messina, in lat. 38° 7′ N. and long. 13° 21′ E. (Map: Italy, D 5). The entrance to the bay affords a beautiful view. The city, which has been called "la felice" (the happy), stretches magnificently along the shores. It is surrounded by the beautiful plain of the Conca d' Oro and is nobly backed by mountains reaching a height of nearly 3500 feet, the shapely Monte Pellegrino rising on the north and Cape Zaffarano stretching away to the east. The mean annual temperature is 63.6° F. In summer a refreshing wind blows up daily from the east, across the water.

Many of the streets are unpaved and are disagreeable from dust at certain seasons of the year; the avenues are regular, and Palermo is, on the whole, well built and clean. There are four quarters, which are formed by the Corso Vittorio Emanuele and the Via Macqueda. At their intersection is the small but lively square called Quattro Cantoni, the geographical centre of the city. It has eight sides and is faced by façades decorated with statues of the holy virgins of Palermo, kings of Spain, and the seasons of the year. The houses generally are provided with balconies. There are many civil and domestic buildings dating from the twelfth to the fifteenth century. The oldest existing buildings date from the time of the Norman kings. The Corso, the main street, leads from the sea to the cathedral and royal palace in the southwest corner of the city, the official centre. Here the vast and picturesque cathedral faces the Piazza del Duomo (which is surrounded by 16 huge sacred statues) and stands adjacent to the important Piazza Vittoria. A statue of Santa Rosalia rises in front. The church, which was originally built 1169–85, has a fine façade of 1350–59 and has been altered and internally spoiled in later times, especially by the dome of 1790. It contains many fine tombs, including that of Frederick II. In the chapel of Santa Rosalia lies the saint in a silver sarcophagus (1631), which is exhibited to the people thrice annually. Another interesting church is San Giovanni degli Eremiti, with five domes of very Oriental character and charming cloisters, a Norman structure belonging to the early part of the twelfth century. The superb San Salvatore is a creation of Amato, and the Carmine Maggiore is also fine. The spacious La Martorana dates from 1143. In it are the headquarters of the important Conservazione dei Monumenti di Sicilia. In the Oratorio del Santissimo Rosario is a notable altarpiece by Van Dyck.

The Palazzo Reale, or royal palace, stands on the site of a castle built in Saracenic times. The spot is associated with the lives of Manfred and Robert Guiscard. There is here perhaps the finest attraction in the city, the Arabic-Norman Cappella Palatina. It owes its origin to Roger II (1132). As a palace chapel it is unsurpassed. It is beautifully ornamented with mosaics, those of the interior being especially noteworthy. Around the Piazza Vittoria stand, in addition to the royal palace, the Palazzo Sclafani, now serving as barracks; the archiepiscopal palace, dating from the fifteenth century and possessing several graceful architectural features; and the Palazzo Municipio, containing a beautiful Greek statue of Antinoüs. Perhaps the finest palace is the massive Palazzo Chiaramonte (1307–80), now used as a courthouse.

Among the fine new buildings in Palermo is the Government Finance Bureau. The modern Casino is found in the Palazzo Geraci. The beautiful Garibaldi garden lies near the small harbor of La Cala, from which, along the sea, extends the magnificent and fashionable esplanade Foro Italico as far as the Villa Giulia, or the Flora. This public park, beautified with the rarest trees, is scarcely rivaled in Italy. It has monuments to the poet Meli and to Frederick II and a meritorious modern marble group of the Greek heroes, the Canaris, chiseled by Civiletti. Adjacent is the splendid Botanical Garden. Not far away, on the south side of the city, is the Garibaldi gate where the patriot entered in 1860. In the northwestern part of the city extends the modern Via della Libertà, the popular drive in winter. It passes through the English Garden, opposite the gate of which is a fine equestrian statue of Garibaldi dating from 1892. In this direction lies the newest quarter of Palermo. It is occupied chiefly by foreigners. There are in the city a monument to Philip V (1856), a statue of Charles V, the historic statue of the Genius of Palermo, and a statue of Victor Emmanuel I. In the Piazza Croce del Vespro stands a memorial (marble column and cross) erected in 1737 to the French buried here after the Sicilian Vespers.

The National Museum is in the suppressed monastery Dei Filippini and is interesting. Among its more valuable contents is an exceptionally fine altarpiece with wings, of the early Flemish period, attributed by some to Cornelissen, by others to Mabuse. Here also are the famous metopes of Selinus, representing almost the highest stage of Greek art.

Palermo is the seat of a university. (See PALERMO, UNIVERSITY OF.) The communal library, rich in material on Sicilian history, has about 220,000 volumes and 3300 manuscripts. The national library has about 170,000 volumes. It together with the lyceum is established in the former New College of the Jesuits. There are in the city three lyceums, a technical institute, four technical schools, a Greek seminary, a conservatory of music, a royal observatory, two teachers' seminaries, a school of commerce, an agricultural institute, etc. Palermo has a fine modern opera house and a new theatre called Politeama.

The manufacturing interests are small. There is now a capacious shipbuilding yard. The commerce is growing, wine, oranges, lemons, sulphur, sumac, grain, and oils being conspicuous exports. Leading imports are coffee, sugar, coal, cotton and woolen goods, silks, and porcelain. The old harbor is the little La Cala, suitable only for small vessels. It is protected on the east by a long narrow mole reaching out towards another mole extending from the north. The new haven lies at the foot of Monte Pellegrino. The city is connected by rail with various parts of the island. Palermo is the third Italian port in importance and the first in Sicily. In 1911 there were entered 3610 vessels, of 3,061,365 tons net, and cleared 3614, of 3,061,021 tons net. The city is provided with electric tramways and a good water supply. At the head of the city government is a syndic. Palermo's great festival is that of Santa Rosalia, from July 11 to 15. Regattas, races, and fireworks are its important features.

The environs, embellished with elaborate villas, are of great beauty and interest. A short distance to the southwest ancient catacombs were discovered in 1785, but were destitute of contents. Monte Pellegrino offers a very attractive ascent and a remarkable view. On its side is the famous grotto (now converted into a church) of Santa Rosalia. The royal château at the foot of the mountain is a splendid seat, with Chinese architectural features. In 1901 the city had 253,541 inhabitants and the commune 309,694; in 1906, 264,036 and 323,747; in 1911 the population of the commune was 341,088; in 1914 the estimated population was 342,500. Only four communes in Italy (Naples, Milan, Rome, Turin) exceed Palermo in population.

The town (anciently Panormus or Panhormus) was of Phœnician origin. It was Carthaginian for a long time, but was taken by the Romans in 254 B.C. Augustus established a colony here. The Byzantines took it from the Goths in 535 A.D. It was a wealthy and powerful Moslem centre after its capture in 831 and became the capital of the Normans in Sicily after its capture in 1071. In 1194 it passed to the Hohenstaufen. The court of Frederick II here was one of the most brilliant in Europe. In 1282 occurred the massacre of the French in Palermo, known as the Sicilian Vespers (q.v.). During the residence of the Spanish viceroys the city was a regal place, and much of its distinguishing architecture and many of its features date from this epoch. It was the scene of revolutionary revolts in 1820, 1848–49, and 1860, and suffered much in consequence. Garibaldi entered the city in 1860. A national exposition was held here in 1890. Consult: Julius Schubring, *Historische Topographie von Panormus* (Lübeck, 1870); E. A. Freeman, *Historical Essays*, 3d series (London 1879); id., *History of Sicily* (ib., 1891); Giorgio Arcoleo, *Palermo und die Kultur in Sicilien*, translated by Nolte (Dresden, 1900); Thomas Gsell-Fels, *Unter-Italien und Sizilien* (5th ed., Leipzig, 1909).

PALERMO, UNIVERSITY OF. An institution founded by Ferdinand IV in 1779. A higher institution of learning existed in Palermo as early as 1394. In 1805 the university was closed and was not reopened until 1850. Since then, encouraged by the government, it has maintained a steady growth. It consists of the faculties of law, medicine, surgery, mathematics and natural science, letters and philosophy, and the schools of pharmacy and engineering. Its attendance was 1669 in 1912–13.

PALES, pā′lēz. In early Roman mythology, a divinity much worshiped by herdsmen. In the Roman poets, who knew the divinity only from the festival, Pales is a goddess, but Varro states that originally the divinity was masculine. The festival, known as the Palilia or, more commonly, as the Parilia, was celebrated on April 21, which was in later times declared to be the day of the founding of Rome. The festival was a purification of the flocks and herds. Stables were swept, sprinkled, purified with sulphur, and adorned with wreaths. Fires of hay and straw were kindled, over which the worshipers sprang three times, and doubtless drove the herds. Prayers for the increase of the flocks were made, and also offerings of milk and cakes, but no bloody sacrifices. Consult W. W. Fowler, *Roman Festivals* (London, 1899), and Georg Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

PALESTINE, păl′ĕs-tīn (Lat. *Palæstina*, from Gk. Παλαιστίνη, *Palaistinē*, from Heb. *Pĕlishti*, Philistine). The name was originally applied to the coast land occupied by the Philistines, but later extended to include the land of Israel. The exact limits of Palestine, in its ordinary wider significance, are somewhat indefinite. A line drawn through the deep gorge of the Leontes, after it turns abruptly to the west to reach the sea, eastward to Mount Hermon will give a satisfactory northern boundary; the southern boundary may be marked by a line running east and west through the southern extremity of the Dead Sea. The western boundary is, of course, the Mediterranean coast line, while the eastern boundary was always rather vague. A line from Mount Hermon in the south to the southern limit above mentioned will represent its general locality. In other words, Palestine lies between lat. 31° and 33° 20′ N., and extends from the sea to about long. 35° 45′ E. The territory thus bounded extends about 150 miles north and south, the breadth ranging from about 35 miles at the extreme north to 110 in the south. The west Jordan portion varies in breadth from 23 to 80 miles. It comprises something over 6000 square miles, that east of the Jordan somewhat more than 3000 square miles.

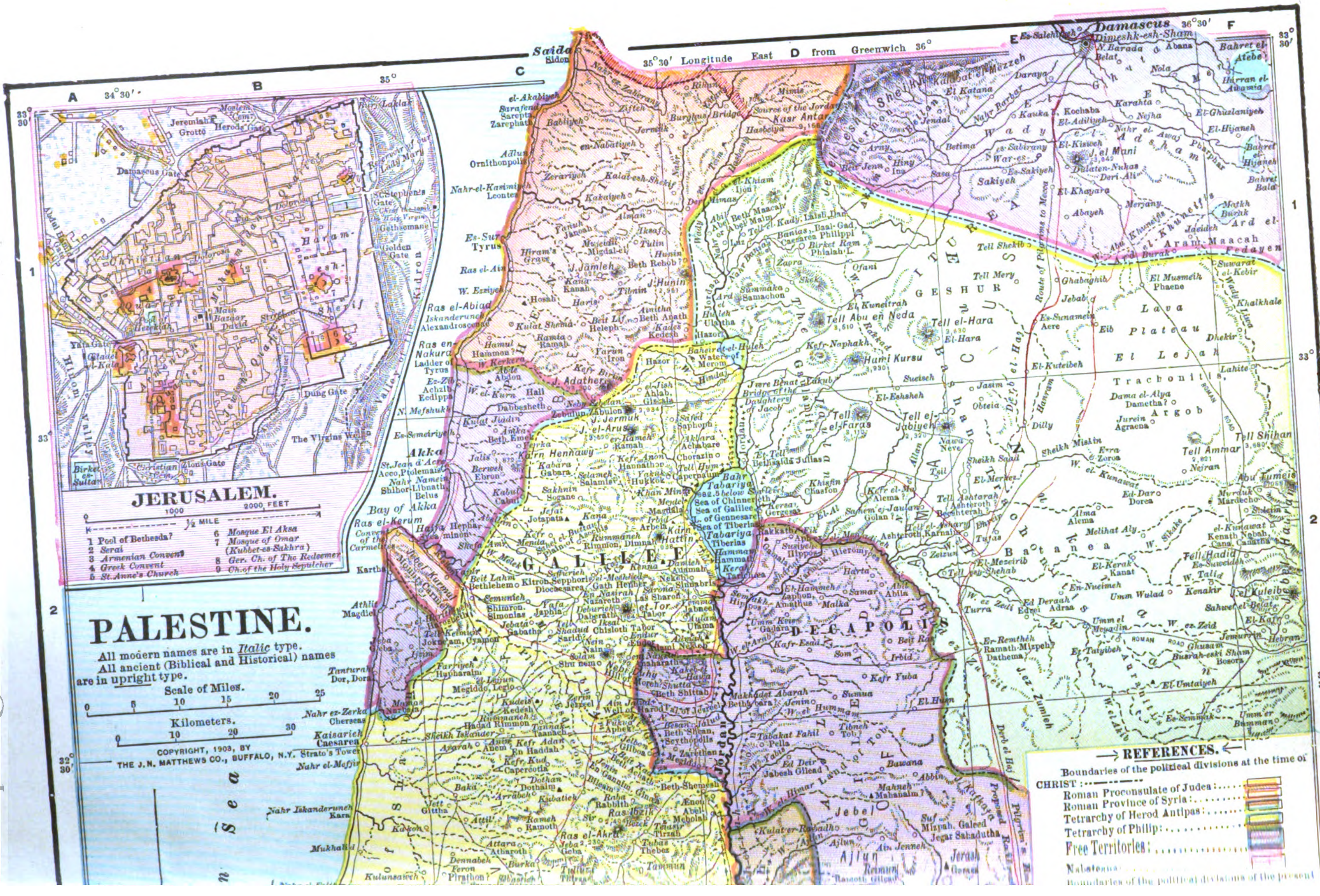
Physical Features. The striking physical features of Palestine are due mainly to the remarkable depression through which flows the Jordan (q.v.). This depression is due to a geological disturbance by which the whole plateau east of the Mediterranean was rent in two from north to south as far as the Red Sea. In Palestine the strata just west of the fault broke and fell with a strong dip towards the deep valley thus formed. Throughout nearly the whole course of the Jordan and to a short distance south of the Dead Sea this valley is now lower than the level of the Mediterranean. The waters of Merom (Lake Huleh) are about 7 feet above sea level, the surface of the Sea of Galilee, about 10 miles farther south, is 682 feet below the sea, while the surface of the Dead Sea, 65 miles south of the Sea of Galilee, lies 1292 feet below sea level, with the bottom 1300 feet lower still.

In the Jordan valley and in many parts of the East Jordan land hot springs exist. These show that the ancient volcanic activity, evidenced not only by many earthquakes recorded in history, but especially by the great lava plateau (with many extinct volcanoes) which stretches from the Sea of Galilee to the Hauran (q.v.), is not yet entirely quiescent.

The surface of Palestine may be divided, roughly speaking, into four parallel zones—the seacoast plain, the hills and mountains west of the Jordan, the valley of the Jordan, and the plateau region east of the great depression.

The hilly range west of the Jordan is broken and irregular in character. It may be divided into several distinct regions. At the extreme south is the Negeb or south region (literally the dry or parched land), a desert table-land, 1500–2000 feet above sea level, intersected by wadies or ravines running east towards the Dead Sea or northwest towards the Mediterranean. The largest of these is the Wady es Seba, which passes by ancient Beersheba and enters the Mediterranean as Wady Ghuzzeh a few miles south of ancient Gaza.

The northern part of the Negeb is higher (about 2500 feet above sea level) and more broken. The central ridge now becomes more pronounced and the highland or mountain region of Judah begins. The highest portion of the Judæan Range is near Hebron (3370 feet). Towards Jerusalem the level sinks in places to about 2400 feet, but becomes higher as it extends north. The crest of the Judæan highland averages nearly 15 miles in breadth. From it the descent to the Dead Sea, 10 or 15 miles away, is rapid, breaking down finally in precipitous cliffs. The whole region bordering on the Dead Sea is wild, barren, and rocky. It was known as Jeshimon (the desert waste, cf. Num. xxi. 20), and its upper reaches nearer the central plateau formed the Wilderness of Judah with its various subdivisions, the Wilderness of Tekoa, of Jeruel, of Maon, etc. West of the Judæan highland the country sinks gradually towards the coast plain. This region of hills and valleys was known as the *Shephelah*, i.e., the low land. In the more open valleys and on the hillsides both the Shephelah and the central plateau are capable of high cultivation. In other parts, especially the uplands, they are more suited for pasturage. From the coast plain several large valleys lead up into the interior highlands, of which those of Ajalon, of Sorek, and of Elah have become famous as scenes of great conflicts between invaders and defenders of the uplands.



PALESTINE.

All modern names are in *Italic* type.
All ancient (Biblical and Historical) names are in upright type.

Scale of Miles.
0 5 10 15 20 25

Kilometers.
0 10 20 30

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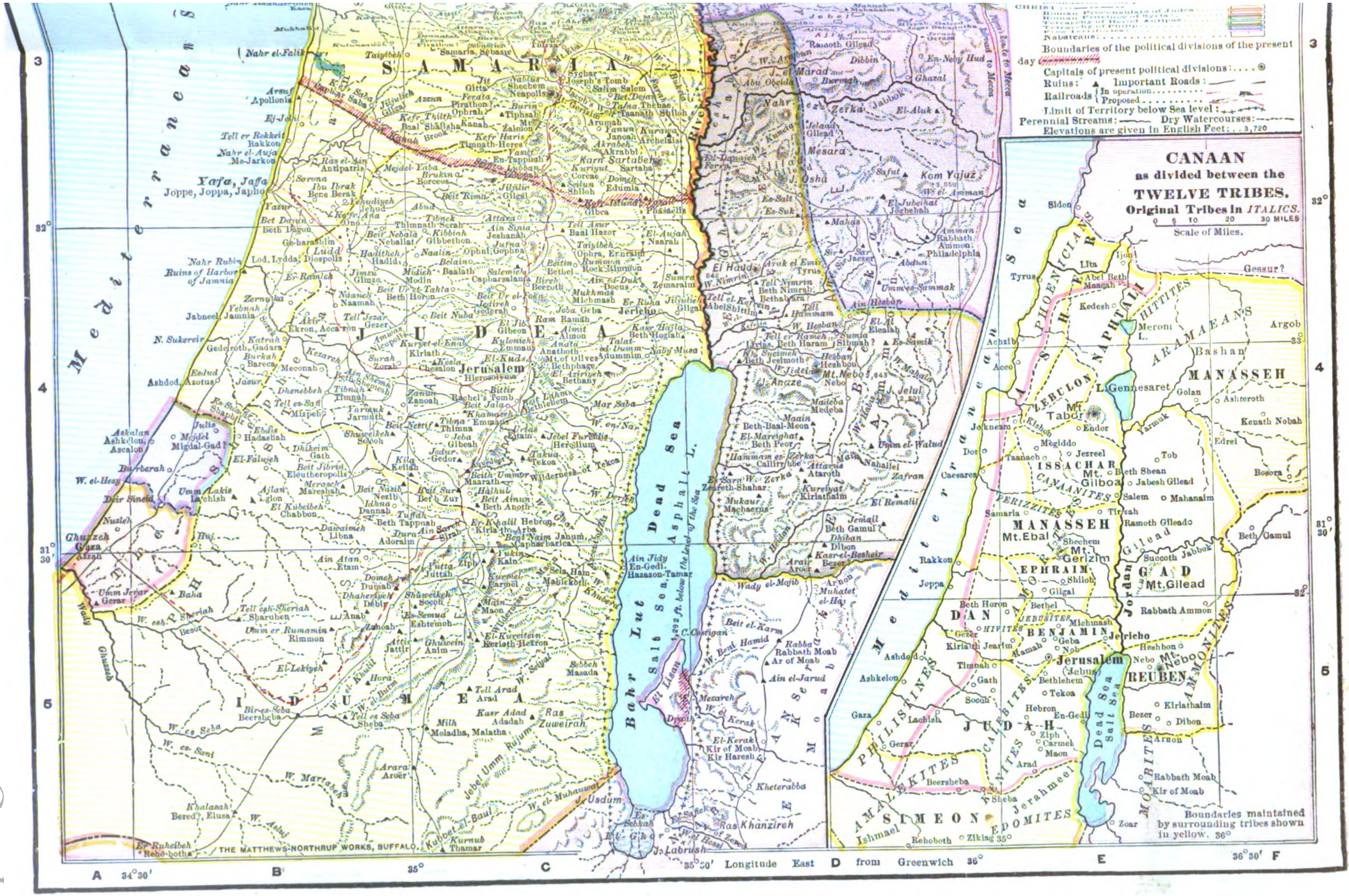
Boundaries of the political divisions of the present day
Capitals of present political divisions
Ruins
Important Roads
Railroads In operation
Proposed
Limit of Territory below Sea level
Perennial Streams
Dry Watercourses
Elevations are given in English Feet
CANAAN
as divided between the
TWELVE TRIBES.
Original Tribes in ITALICS.
Scale of Miles.
0 5 10 20 30 MILES
Boundaries maintained by surrounding tribes shown in yellow.
SAMARIA
JUDEA
IDUMEA
PHILISTIA
Mediterranean Sea
Dead Sea
Salt Sea
Bahr Lut
Asphalt L.
1,292 ft. below the level of the Sea
Jerusalem
Jericho
Yafa, Jaffa
Joppe, Joppa, Japho
Ghuzzeh
Gaza
MANASSEH
EPHRAIM
DAN
BENJAMIN
JUDAH
SIMEON
REUBEN
GAD
ISSACHAR
ZEBULON
NAPHTALI
ASHER
PHILISTINES
AMALEKITES
EDOMITES
MOABITES
AMMONITES
ARAMAEANS
HITTITES
PHOENICIANS
Longitude East from Greenwich
34°30'
35°
35°30'
36°
36°30'
31° 30'
32°
A
B
C
D
E
F
3
4
5
THE MATTHEWS-NORTHRUP WORKS, BUFFALO.

The central highland continues north of Jerusalem for upward of 40 miles, but with less uniformity. North of Bethel (10 miles north of Jerusalem) it begins to be broken. The general level sinks, though many peaks are over or nearly 3000 feet high. The descent to the Jordan valley is in places very abrupt, though also traversed by a number of passable valleys. One of these, the Wady Farah, pierces far into the interior. Near Shechem, situated in a beautiful vale between Mount Gerizim (2849 feet) on the south and Mount Ebal (3077 feet) on the north, several valleys have their origin. One of these, the Wady esh Shair, opens out northwest into the plain in which the city of Samaria was situated and continues on to the coast. Another opens into the Wady Farah and thus gives open connection with the Jordan valley. Near Shechem, then, the central highland breaks down into a system of valleys, plains, and isolated peaks. Between Bethel and Shechem, especially along its western border, the whole plateau is more open and undulating, more fertile and capable of cultivation, than that of Judah to the south. This hilly region was known as Mount Ephraim. The part of the coast plain west of Mount Ephraim is the famous Plain of Sharon.

To the north of Samaria the country takes on a new character. The low-lying Plain of Dothan connects the seacoast region with the great Plain of Esdraelon (q.v.), a triangular-shaped expanse, about 16 miles across, midway between the Jordan and the sea, with an average elevation of but about 250 feet. This remarkable district is separated from the seacoast plain to the west by a series of low hills running northwest from the Plain of Dothan and culminating in the Carmel Range (1500–1800 feet), which juts out into the Mediterranean in a promontory 556 feet high, at the foot of which there is a narrow strip of beach. The Plain of Esdraelon is shut in on the east by the Gilboa Mountains (1300–1650 feet) and the hills near the site of ancient Shunem and Nain. Between these two ranges of hills the deep valley of Jezreel, all of it below the sea level, leads down to the Jordan. The northeastern corner of the plain opens out into another rapidly descending valley across which Mount Tabor (1843 feet) rises in lonely grandeur.

North of Esdraelon, in lower Galilee, the mountains begin to reappear. The whole region between the Sea of Galilee and the Mediterranean (i.e., the Galilee of the New Testament) is quite open. None of the peaks attains a height of 2000 feet, and they are for the most part isolated and interspersed with valleys and plains. There are two main systems of hills in this lower Galilee. One bounds the Plain of Esdraelon on the north, extending from the river Kishon just opposite Mount Carmel to the Sea of Galilee. North of these hills, extending from the northwest coast of the Sea of Galilee to the coast plain, is a long, low plain broken into several portions by low hills crossing it from north to south. The eastern end of the plain as it descends to the Sea of Galilee forms the land of Gennesaret, of almost fabulous fertility. A second line of hills, north of the long plain, completes the hill system of lower Galilee. To the north upper Galilee consists of a high central plateau with an elevation of 2000–3000 feet, with occasional peaks still higher. This plateau is narrower at the north than in its southern portion and is terminated by the Leontes, which, rising between the Lebanons, makes a sharp detour to the west and enters the sea just north of Tyre. East of the Leontes the mountains of Galilee form the southern portion of the great Anti-Lebanon Range.

Across the valley through which flow the upper courses of the Jordan lies Mount Hermon, whose summit is 9166 feet above the sea. Out from the depths of this vast mountain flow most of the springs which combine to form the Jordan. Where these streams converge the valley is 8 to 10 miles wide and but little above the level of the sea. It soon becomes marshy and at last opens into Lake Huleh. It then narrows and the stream descends rapidly to the Sea of Galilee. From this lake to the Dead Sea, 65 miles, the Jordan valley varies in width from 3 to 14 miles. It is only about 4 miles wide where it leaves the Sea of Galilee, but broadens where it is joined by the valley of Jezreel, 13 miles below. It again narrows, but after receiving the Jabbok continually widens until, at Jericho, it attains its maximum breadth. On either side of the valley the ascent to the highlands is generally steep. The western side is much broken by many ravines and passes, but the eastern hills present a more uniform appearance, being broken only at long intervals by the larger streams. The Dead Sea marks the deepest part of this great depression. It has no outlet, and the constant evaporation, aided by the saline character of many of the springs in the neighborhood, makes its waters so heavily charged with salt that they are exceedingly bitter in taste and of high specific gravity. They are, nevertheless, very transparent. In some places the shores are heavily lined with salt deposit. The Dead Sea is also remarkable for the petroleum springs below its surface, from which come the lumps of bitumen often found floating on its waters. Hence its ancient name, Asphaltis. The sea is deepest (about 1300 feet) at its northern end. The southern half is quite shallow. Lying at a level of 1292 feet below the sea and surrounded by hills rising 3000 to 4000 feet above its surface, the Dead Sea is one of the hottest regions on the earth.

Across the deep, hot valley lies eastern Palestine, much more uniform in character than the territory west of the Jordan. It divides naturally into three main sections. From Mount Hermon to the Yarmuk (Hieromax), a large perennial stream traversing the eastern plateau and emptying into the Jordan, the limestone is overlain with a thick volcanic formation. Extinct volcanoes abound and the lava soil renders the region extraordinarily fertile. Only the western portion, the Jaulan (ancient Gaulanitis), belongs within the limits of Palestine. The eastern portion represents the ancient Bashan. The general elevation is highest near Hermon, gradually sinking towards the Yarmuk. The drainage is all west (to the Jordan) or south (to the Yarmuk). Only near the Sea of Galilee and the Yarmuk is the plateau much broken by ravines.

South of the Yarmuk to the Jabbok and from the Jabbok to the Arnon, a total distance of nearly 100 miles, lie ancient Gilead and the Plains of Moab, identical with the Peræa of New Testament times. The lava soil characteristic of the region north of the Yarmuk is not found here. Basalt gives place to limestone, and the soil, though fairly well watered, is of inferior fertility. It is consequently less fitted for agriculture, but has ever been famous for its pasturage. It is a high rolling plateau broken only by the larger wadies running to the Jordan. North Gilead (modern Ajlun, north of the Jabbok) is not so high as south Gilead and the Plains of Moab (the modern El Belka), but more heavily wooded and better supplied with water. The most southern portion, south of the Arnon, and the home of ancient Moab, is even more barren and dry, yet still suitable for pasturage.

Palestine is somewhat deficient in its water supply. During the winter there are heavy rains, but the numberless wadies, with few exceptions, are dry in the summer or dry season. Only where the hard limestone is near the surface, at the foot of high hills, as in central Palestine and Galilee, are perennial springs numerous. The Jordan is the only considerable stream. Its sources are perennial springs mostly flowing from the slopes of Mount Hermon. Of these the most famous is that near Banias, the ancient Paneas, near the site of Dan, where the stream issues forth from a large cave. The Jordan is supplied farther down by several perennial affluents, of which the Yarmuk, the Wady el Arab, and the Jabbok on the east and the Nahr Jaluad (in the valley of Jezreel) and the Wady Farah on the west are the most important. On the western slope the Leontes, at the extreme north, the Kishon (which drains the great Plain of Esdraelon), and the Zerka or Crocodile River are perennial.

Palestine has but two seasons. The rainy or winter season begins in October-November with the early rain. This softens the soil and enables the farmers to plow. The rain, with occasional snows on the mountains, falls more or less continuously until February. During February sowing takes place. Some weeks later (March-April) the so-called latter rain is indispensable to the well-being of the now growing crops. By May the rains are over and the long hot summer (May to October) begins. The average annual rainfall is 21 inches. The highlands are dry and salubrious, the lowlands moist and oppressive. The mean annual temperature of the uplands is 63°, with an average maximum of 100° and an average minimum of 34°. The prevailing winds are from the sea, northwest in summer, west or southwest in winter. The hot winds (sirocco) carrying clouds of dust from the deserts east and south often inflict damage and severe discomfort.

Flora and Fauna. Considering the limited area and the fact that portions of the country are barren, the flora of Palestine is remarkably rich. This is owing to the fact that Palestine is the meeting point of three large floral regions which differ considerably from each other, the Mediterranean, the Asiatic steppe flora, and the tropical flora of Arabia and Egypt. The latter is confined to the valleys, in which the papyrus grows near the water; dates, bananas, figs, olives, almonds, as well as myrtles, acacias, azaleas, and many other Mediterranean and tropical plants, are also abundant. On the mountain slopes north of Judæa there are some heavy forests. On the lower slopes they are deciduous, chiefly of oak and beech, with maples, poplars, plane trees, and mulberries. Higher up there are pine forests associated with spruce, cypress, juniper, and cedars, including some remaining specimens of the cedar of Lebanon. The fauna is also varied, including over 100 species of mammals and several hundred birds. The larger wild animals, however, such as the lion, bear, and leopard, have quite disappeared. The most characteristic surviving mammals are mountain goats and the hyrax (q.v.).

Present Economic Condition. The economic development of the country has been hindered by the lack of a settled agricultural population, the present inhabitants being largely of a seminomadic type. The soil can be rendered highly productive by irrigation and careful cultivation, but it has largely lain barren and uncultivated for many centuries. The herding of sheep and goats has ever been one of the chief means of support of the inhabitants. Within the last 50 years, however, considerable areas of waste land have been brought under cultivation through the efforts of Western agricultural colonists. Attempts to found agricultural settlements were made by Germans and Americans as early as 1850, but the first successful colonies were those founded by Germans at Jaffa and Haifa in 1868, and later at Jerusalem. Since then several other colonies have been founded by Jewish immigrants impelled by the Zionist movement. (See ZIONIST MOVEMENT.) Though they have not all been successful, the net result has been a distinct improvement in the economic conditions of the country. Modern agricultural methods have been introduced and serve as an example to the native farmers, and new industries have sprung up. Roads have been greatly improved, and wagons have begun to replace camels and mules. A railroad has been built from Jaffa to Jerusalem, another between Haifa and Damascus, and in 1915 a third was in process of construction east of the Jordan from Damascus to Mecca.

Political Geography and History. The early history of Palestine, to the sixteenth century B.C., is exceedingly obscure, although archæological investigations have revealed much concerning the character of the civilization of the primitive inhabitants. From the records of the Egyptians we learn that it was a part of the land of the Amu (southwestern Asia), earlier called by the same people Lotan or Ruten. The term Kharu was a designation for southern Palestine, Amor or Amur for the northern district and the Lebanon region. The earliest Babylonian records appear to have included the country under the term Martu (the west land), which later gave way to Amur, or the land of the Amorites. While Egyptian forces may have made occasional incursions into Palestine earlier than the sixteenth century B.C., the dominant power in southwestern Asia at this early period was Babylonian. This supremacy gave way to the so-called Amoritic, i.e., the incoming of great numbers of Semites (q.v.) from the Arabian deserts. These either absorbed or exterminated the older population, and, being of the same general Semitic stock as the Babylonians, readily learned and adopted their culture, so that the civilization of Babylonia continued dominant. Egyptian inscriptions show that this people prospered in Palestine and engaged in commerce with Egypt. Egyptian overlordship over Palestine was fully established by Thothmes III (c.1500–1450 B.C.). His famous list of 119 subjugated towns includes names of many places in Palestine. He organized the conquered territory and appointed governors to look after his interests. The Tell el Amarna letters (see AMARNA LETTERS) show that the common name of the land was Canaan (see CANAAN; CANAAN-

ITES) and that the language of the people was simply an earlier form or dialect of that known later as Hebrew, spoken not only by Israel but also by the Phœnicians, the Moabites, and the Edomites. They show further that under the weak rule of Amenophis IV (1375–1358 B.C.) Palestine was rapidly passing away from Egyptian control. The Hittites (q.v.) from the north and the Khabiri (a part of the great Aramæan movement to which the Israelites belonged) in the central and southern regions were seeking to gain possession. This era of confusion was ended by the revival of Egyptian supremacy under the new (nineteenth) dynasty (c.1350 B.C.), whose kings, Seti I and Ramses II, rolled back the Hittite advance and again reduced Palestine to complete submission to Egypt. The next Egyptian dynasty was weak and Palestine broke up into a number of petty kingdoms.

About this time (1300–1100 B.C.) two distinct peoples, of different origin and character, sought to make this country their home, viz., the Philistines (q.v.) and the Israelites. The former became the dominant people of the whole seacoast plain. The latter, after varied experiences, began a series of conquests which resulted finally in giving them control of Palestine.

The Canaanites appear to have offered little united opposition. Only one concerted action on their part is recorded, the confederacy of five kings in the region west of Jerusalem (Josh. x). The work of conquest was long and gradual. At first the Israelites held but little more than the hills. The seacoast plain and the Plain of Esdraelon, defended by heavy armed troops with chariots, they avoided. Ultimately Israel became dominant, though in many cases probably the two peoples lived side by side on terms of equality. The old language of Canaan was used by the Israelites, and with the adoption of the language went the adoption of many Canaanitish ideas and customs, also the knowledge of the Babylonian culture then prevalent in the country.

The Israelite tribes were finally settled as follows: east of the Jordan between the Arnon and the Jabbok the Reubenites and the Gadites had their homes. The Reubenites appear to have soon lost their identity, either because they were gradually absorbed by the Gadites, who finally occupied this territory, or because they gradually drifted further eastward and became absorbed among other tribes nearer the desert. The western highland from Jerusalem southward was the home of Judah. Southwest of Judah lay the territory of Simeon. Between Judah and the Plain of Esdraelon the country was occupied mainly by the house of Joseph, i.e., the tribes of Benjamin (northeast of Judah), Ephraim (the central portion), and Manasseh (the northern part). A small district northwest of Judah was occupied by the tribe of Dan, but it was so small that a large section of this tribe (600 families) migrated to the extreme north near the sources of the Jordan (cf. Judg. xvii and xviii). In the valley of Jezreel and the fertile Plain of Esdraelon lay the territory of the tribes of Issachar (the eastern portion) and Zebulon (the western part). Part of southern and all of northern Galilee was occupied by Naphtali (on the east) and Asher (on the west behind the Phœnician territory of Sidon and Tyre). After the conquest men of Manasseh recrossed the Jordan and conquered north Gilead, between the Jabbok and the Yarmuk, and probably part of Golan and Bashan, north of the Yarmuk. The coast north of Carmel remained in possession of the Phœnicians. South of Carmel the Philistines controlled it. Israel was never a seafaring people.

About 1030 B.C. the tribes of Israel were confederated into a kingdom under Saul, of the tribe of Benjamin. His successor, David, of Judah, completed the work of firmly establishing Israelite supremacy in Palestine. Under David and Solomon, for the first and only time in its history, Palestine was the home of a free people all under one central government. About 933 B.C. this unity gave way to the formation of two kingdoms, a northern (Israel) and a southern (Judah).

The northern kingdom fell before the power of Assyria in 722 B.C. The annals of Sargon, the Assyrian King, state that he deported 27,290 people and, according to Assyrian custom, transported thither a number of Aramæans from Babylonia. Others were added later. These united with the remnant of the old Israelitic stock, and thus a mixed population, but still essentially Semitic, came to occupy the old Ephraim-Manasseh territory. Galilee seems to have gradually filled with a mongrel Phœnician-Syrian population, which was not seriously disturbed till near 100 B.C., save by the Ituræan occupation. See ITURÆA.

The southern kingdom came to an end when Nebuchadnezzar of Babylon captured Jerusalem in 586 B.C. The best elements of Judah were carried to Babylon and the whole country left desolate. During the next half century Nabatæan Arabs appear to have pressed in from the deserts east and southeast, occupied much of the old Ammonite and Moabite territory, and, forcing the Edomites out of their abode, pushed them northward into southern Judah, which now became Idumæan territory. The Jewish exiles who returned from Babylonia by permission of Cyrus in 536 B.C. occupied only the northern part of the old Kingdom of Judah. For further details of the history of Palestine during this period, see JEWS.

Under the Persian Empire Palestine was a part of the Province or Satrapy of Syria (i.e., of the regions west of the Euphrates). The satrapy was subdivided into a number of districts, of which Judah, Samaria, and Phœnicia certainly were administered by separate governors. Through the labors of Ezra and Nehemiah (qq.v.) the Judæan community was thoroughly consolidated, Jerusalem fortified, and foreigners expelled. The Jews constantly encroached on Samaritan territory and gradually enlarged their border towards the northwest. The Samaritans also became more closely united through the founding of the Samaritan religion, based on the Pentateuch alone, by a priest who was expelled from Jerusalem by Nehemiah, and, at a date now not known, by the building of a temple on Mount Gerizim. (See SAMARITANS.) During the Persian period the language of the Jewish community assimilated itself to the Aramaic spoken throughout the region, and the old Hebrew gradually ceased to be the tongue of the common people.

The chief result for Palestine of Alexander's conquest of the East was the introduction of a large Greek element. Samaria was destroyed and rebuilt as a Macedonian city. It is possible that Pella and Dium, east of the Jordan, were built by Alexander's veterans. Other Greek cities followed, especially in the East Jordan land (see DECAPOLIS), while many of the old sites became practically Greek cities. Alexander followed the Persian example and attached Palestine to Syria for administrative purposes. In the struggles of his successors it came into the hands of Ptolemy I of Egypt and until 197 B.C. was under Egyptian control. Then it passed to Antiochus III (the Great) of Syria. In 168 B.C. the attempt of Antiochus IV to destroy the Jewish religion led to the great War of Independence. (See JEWS; MACCABEES.) When the struggle was over Judæa, now free and under the Hasmonæan or Maccabæan priest-princes, controlled all southern Palestine from the Jordan to the coast. The rest of the land, nominally under Syria, was practically in a condition of anarchy. East of the Jordan the Nabatæan Arabs were in possession of all but the territory of the Greek cities. Under the Hasmonæans Hyrcanus I, Aristobulus I, and Alexander Jannæus (135–78 B.C.) the Jews subjugated, first Idumæa and Samaria, then Galilee, and finally nearly all of the old East Jordan territory. The Idumæans and Galileans were compelled to adopt Judaism, while the Samaritans saw their temple (c.127 B.C.) and capital (c.108 B.C.) destroyed. The Greek cities east of the Jordan also suffered greatly. The Jewish population of Galilee, so familiar to the readers of the New Testament, dates only from 105–104 B.C.

Quarrels of rival Jewish factions opened the way for Roman intervention. Pompey arrived in Syria and captured Jerusalem in 63 B.C. From 63 B.C. until 67 A.D. Palestine was a part of the new Roman Province of Syria. During most of this time Judæa and other districts were under the control of Herod the Great and his successors. (See HEROD.) The greater part of the country was included in the four districts, Judæa, Samaria, Galilee, and Peræa (east of the Jordan, south of the Jabbok). The territory north of the Jabbok was broken up into minor divisions, Gaulanitis, Auranitis, Trachonitis, Batanæa, etc., under petty tetrarchs or governors. At the breaking out of the Jewish War (66–67 A.D.) Palestine was made a separate province under charge of Vespasian. The great struggle against Rome was closed by the capture and ruin of Jerusalem in 70 A.D. and the destruction of the Jewish state. New cities now sprang up under Roman protection, and apart from Jerusalem the country was prosperous. In 132–135 occurred the revolt of the Jews under Bar-Cochba, which was put down with fearful bloodshed and devastation. The Emperor Hadrian in rebuilding Jerusalem changed its name to Ælia Capitolina and absolutely forbade any Jew to dwell in it. Never since has Jerusalem been a Jewish city or Palestine a Jewish land. Greeks, Romans, Arabians, and large elements of the fundamental Aramæan (Syrian) stock, with the remnant of the Jews, made up its population then, and of these the Arabian and Syrian are dominant to-day.

Palestine remained an integral part of the Roman Empire, and afterward of the Byzantine Empire until the invasion of the Persian King Khosru II in 614. Up to the era of Constantine the condition was especially flourishing. Remains of buildings and cities in now absolutely deserted places are a wonderful testimony to the great prosperity. After Constantine and the division of the Empire Greek Christianity became dominant and Palestine became a Christian land. It was now the habit to speak of it as divided into Palestina Prima (Judæa and Samaria), Secunda (Galilee), and Tertia or Salutaris (Idumæa and Moab). Each of these districts was divided ecclesiastically into various bishoprics. See also the article JEWS for Palestine during the Roman period.

The Persian control was transient, but that of Mohammedanism, beginning in 635, proved to be permanent. Since then, apart from the era of the Crusades, the history of Palestine contains little of general importance. Partly under the influence of Islam, but much more from other general causes, the culture of the Græco-Roman period passed away, the beautiful cities, temples, and churches fell into decay and ruin, and no new developments took their place. The era of degeneration had set in. The Latin Kingdom of Jerusalem (see JERUSALEM), founded by the Crusaders in 1099 and overthrown by Saladin in 1187, was only an episode of no permanent value, though the Crusaders left their imprint in churches, monasteries, etc., all over the land.

After the conquest by the Ottoman Turks in 1516 the condition of Palestine became only worse. In the nineteenth century, however, mainly as a result of the labors of the missionary societies, the beginnings of new activity and a better era appeared. The large influx of Jews from Europe under the Zionist movement, and above all the opening of the country to railway enterprise, promise a better future.

Modern Palestine is broken up into a number of administrative districts. The Mutessarif of the Sanjak (province) of Jerusalem governs the southern part west of Jordan. The remainder of western Palestine with the Belka is a part of the Vilayet of Beirut. East of the Jordan all north of the Jabbok belongs to the Sanjak of Hauran. The population of the Sanjak of Jerusalem is about 340,000; that of the remainder of the country is variously estimated, but exact figures cannot be obtained. The total is probably near 650,000. It has increased more rapidly in later years. Under a good government and with more thorough cultivation several times this number of inhabitants could be easily supported.

Bibliography. The literature on Palestine is enormous and will be found fully registered down to 1878 in Röhricht, *Bibliotheca Geographica Palestinæ* (Berlin, 1890). Outside of the Bible and Josephus the older works of importance are few. The *Onomasticon* of Eusebius (Lat. trans. by Jerome) and the various accounts of pilgrimages from Jerome to the Crusaders are valuable as contemporary witnesses, but not reliable for identification of ancient sites or for ancient history. The great works of Reland, *Palestina* (Utrecht, 1714), and Karl Ritter, *Erdkunde*, vols. xiv–xvii (Berlin, 1848–54), are still of great value, especially for the notices by early writers. The results of modern exploration are given in Robinson, *Biblical Researches* (Boston, 1841, 1856); id., *Physical Geography* (Boston, 1865); the various works of Titus Tobler from 1849 to 1868; V. Guérin, *Description de la Palestine* (7 vols., Paris, 1868–89); the *Quarterly Statements* of the Palestine Exploration Fund (London, 1869 et seq.); the seven quarto volumes of the *Survey of Palestine*, published by the Fund, to which have been added recently three more by R. A. Macalister on *The Excavations of Gezer* (1912) and one by Bliss and Macalister on *Excavations in Pales-*

tine (1912); in the publications of the German Palästina-Verein (Leipzig, 1878 et seq.); the annual volumes of the Society of Biblical Archæology (London); H. Vincent, *Canaan d'après l'exploration récente* (Paris, 1907); C. M. Cobern, *Recent Explorations in the Holy Land and Kadesh-Barnea* (Meadville, Pa., 1915). To these, as of special value, may be added: *The Library of the Palestine Pilgrims' Text Society* (13 vols., London, 1897); Tristram, *The Fauna and Flora of Palestine* (ib., 1884); Hull, *The Survey of Western Palestine* (ib., 1886); G. Schumacher, *The Jaulan, across the Jordan*, and *Ajlun* (ib., 1888–90); F. J. Bliss, *Development of Palestine Exploration* (New York, 1906); and works published by the Palestine Exploration Fund. Comprehensive general treatises on Palestine are the guide books of Baedeker and Murray; G. A. Smith, *The Historical Geography of the Holy Land* (London, 1897); Buhl, *Geographie Palestina* (Leipzig, 1896), most excellent. For the most ancient period, consult L. B. Paton, *Early History of Syria and Palestine* (New York, 1901), where a full bibliography will be found. See also: D. G. Hogarth, *The Nearer East* (London, 1902); J. H. Breasted, *History of the Ancient Egyptians* (New York, 1908); E. Meyer, *Geschichte des Altertums* (Berlin, 1909). The standard histories of Israel and the archæologies of Benzinger (2d ed., 1907) and Nowack (1894) are valuable for the Old Testament period. For the era from 175 B.C. to 135 A.D., Emil Schürer, *History of the Jewish People in the Time of Jesus Christ* (Eng. trans., 5 vols., New York, 1896), is the most reliable work. See also Le Strange, *Palestine under the Moslems* (ib., 1890); William Sanday, *Sacred Sites of the Gospel* (Oxford, 1903); G. R. Lees, *Village Life in Palestine* (New York, 1905); Elihu Grant, *Peasantry of Palestine* (Boston, 1907); Henry van Dyke, *Out of Doors in the Holy Land* (New York, 1908); E. G. Masterman, *Studies in Galilee* (Chicago, 1909). Excellent maps are those of Smith and Bartholomew (Edinburgh, 1902) and the maps of Kiepert and of the Palestine Exploration Fund.

PALESTINE. A city and the county seat of Anderson Co., Tex., 160 miles by rail north of Houston, on the International and Great Northern Railroad (Map: Texas, E 4). It has a Carnegie library, a $200,000 county courthouse, and the general offices and shops of the International and Great Northern Railroad. The products of the most extensive industries, having a considerable trade, include cotton, cottonseed-oil, lumber, beef, iron, fruit, and vegetables. There are in the vicinity large iron-ore deposits, also a salt mine of importance. Settled in 1846, Palestine was incorporated under a general law in 1870, and has lately adopted the commission form of government. Pop., 1900, 8297; 1910, 10,482; 1914 (U. S. est.), 11,412.

PALESTINE EXPLORATION FUND, THE. A society founded in London, June 22, 1865, for the accurate and systematic investigation of the archæology, topography, geology and physical geography, natural history, manners, and customs of the Holy Land for biblical illustration. Under its auspices the following expeditions, travels, and excavations have been made: December, 1865–May, 1866, under Captain Wilson, to fix spots for investigation and to collect information; May, 1867–April, 1870, under Lieutenant Warren, to settle questions connected with the holy sites; 1876, under Professor Palmer and C. F. Tyrwhitt Drake, to examine the desert of the Tih; 1872–77, under Captain Stewart, Drake, Lieutenant Conder, and Lieutenant Kitchener, to survey western Palestine; 1873–74, under Clermont-Ganneau, for archæological research; 1881, under Captain Conder, for the partial survey of eastern Palestine; 1883–84, under Prof. E. Hull and Lieutenant Colonel Kitchener, for the geological survey of the Dead Sea region and the Wady Arabah; 1890–93, under Flinders Petrie and Frederick J. Bliss, for the excavation of the buried cities in the mound Tell el Hesy; 1894–97, under Bliss and Dickie, for excavations at the south and the southwestern portion of Jerusalem; 1898–1900, under Bliss, for excavations at Tell es Safi (?Gath), Tell Zakariyah, Tell Sandahannah, and Tell el Judaidah; 1902–09, under R. A. Stewart Macalister, for the excavation of Gezer; 1911–12, under Dr. Duncan Mackenzie, for the excavation of Ain Shems (Beth-Shemesh); 1914, under Captain Newcombe and Messrs. Woolley and Lawrence, for the survey of southern Palestine. Since 1869 the society has issued a *Quarterly Statement* and since 1911 an *Annual*. The more important publications of the society are: *Survey of Western Palestine: Memoirs* (7 vols., 1881–86); *Survey of Eastern Palestine*, by Conder (1889); *Archæological Researches*, by Clermont-Ganneau (2 vols., 1896, 1899); *Excavations at Jerusalem, 1894–97*, by Bliss and Dickie (1898); *Excavations in Palestine, 1898–1900*, by Bliss and Macalister (1902); *Painted Tombs in the Necropolis of Marissa*, by Peters and Thiersch (1905); *The Excavation of Gezer*, by Macalister (3 vols., 1912); the great map of western Palestine; the raised map; the map of modern Palestine (in 20 sheets). The society has also a Palestinian Museum at its office in London. Consult *Thirty Years' Work in the Holy Land* (London, 1895), an official résumé of the work of the Fund prepared by Walter Besant, and Conder, "Palestine," in *The World's Great Explorers and Explorations* (ib., 1889).

PALESTINE PILGRIMS' TEXT SOCIETY, THE. A society established in London, England, about 1885, for the purpose of publishing translations of the early descriptions of Palestine and the holy places, written by pilgrims and travelers between the fourth and fifteenth centuries. These accounts were intended to explain many of the topographical references which abound in ancient and mediæval literature from the earliest times to the periods of the Crusades and later and to illustrate the manners and customs prevalent in the East in bygone times. The narratives are written in Greek, Latin, Arabic, Hebrew, Old French, Russian, and German, and include curious records of pilgrimages, which begin with the *Unknown Pilgrim of Bordeaux* and follow in unbroken line down to comparatively recent date, including such interesting historical monuments as St. Jerome's *Pilgrimage of the Holy Paula* (382 A.D.), Mukaddasi's description of Syria (785), *Jacques de Vitry* (1180), and Bohaedden's *Life of Saladin* (1145–1232). By 1897 the Society had carried out the programme originally outlined, and the results of its labors are found in a library of 14 volumes (1887–1897), including a general index. In 1896 the handling of the volumes was turned over to the Palestine Exploration Fund to be by that organization distributed to the members of the Palestine Pilgrims' Text Society.

PALES'TRA (Gk. *παλαίστρα*, *palaistra*, from *πάλη*, *palē*, wrestling). Properly, a wrestling place; hence one of the schools in which the Greek boys were trained in gymnastic exercises. They were usually private institutions, though in later times some were supported by the state. The name is also applied to that part of the Greek gymnasium which was set apart for wrestling, and sometimes even becomes a synonym for gymnasium.

PALESTRINA, pä'lĕs-trē'nȧ. A town of central Italy, the ancient Præneste (q.v.).

PALESTRINA, GIOVANNI PIERLUIGI DA (1526–94). A great Italian composer, one of the supreme masters of music. He was born in a small town, southeast of Rome, called Palestrina. The year of his birth, as the investigations of Haberl prove almost with certainty, was 1526. His father was Santa Pierluigi, but the composer has never been known by any other name than that of his birthplace. Of his youth and early musical influences or teachers absolutely nothing is known. The first positive information we have regarding him is that he was organist and *maestro di cappella* at the principal church of his native city from 1544 to 1551. During his stay here he married a peasant girl named Lucrezia de Goris, who owned a small vineyard. The chief ecclesiastical functionary of the town was Giovanni del Monte, who afterward became Pope, with the title of Julius III, and who, as sovereign pontiff, maintained his interest in the young composer of Palestrina. In 1551 Rubino resigned his post in the Cappella Giulia, and Palestrina was named for the appointment by his patron, Pope Julius III. As a mark of appreciation the master, in 1554, dedicated his first published work, a book of masses, to the Pope, who was so strongly convinced of Palestrina's greatness that, in the following year, he appointed him one of the 24 pontifical singers of the Sistine Chapel. This act of the Pope was a direct violation of the regulations which excluded laymen from membership. When Marcellus II succeeded Julius III he confirmed the irregular appointment of his predecessor. Unfortunately the pontificate of the master's new patron lasted only three weeks, and on the accession of Pope Paul IV, in 1555, Palestrina was dismissed, with a pension of six gold scudi (about $6) a month. He was so well known, however, that he secured almost immediate employment at the church of St. John Lateran, where he stayed for six years. Then for many years he was director of the church of Santa Maria Maggiore. The crucial test of his life, however, was yet to come. Pope Pius IV, after the close of the famous Council of Trent, appointed, in 1564, a committee of cardinals to investigate and, if possible, reform the condition of Church music. (See SACRED MUSIC.) Palestrina was asked to support the argument of those who in the Council of Trent had fought against a too rigid application of the Pope's radical views, by submitting a mass which should be free from all the errors prevalent at this time and yet be polyphonic in character. In response he wrote three masses, among them the great *Missa Papæ Marcelli*, which, upon its first performance in 1565, was so successful that it won the day, and caused Pope Pius IV to exclaim: "Those are the harmonies of the new song which the Apostle John heard coming out of the New Jerusalem and which an earthly John makes us hear in this earthly Jerusalem." Besides this artistic triumph the work secured for its composer the appointment of composer to the pontifical chapel. On the death of Animuccia, in 1571, he was appointed master of music at the Cappella Giulia, an office which he held up to the time of his death. In 1577 Palestrina received from Pope Gregory XIII the honorable commission to assist in a revision of the Gregorian chant. Pope Sixtus V, in 1585, offered the master the position of *maestro di cappella* of the pontifical singers of the Sistine Chapel, but was unable to overcome the opposition of the singers, who insisted upon the regulation excluding laymen and brought up the master's previous exclusion by Pope Paul IV. A most important event in Palestrina's life took place in the year 1560, when his famous *Improperia* were first heard in St. John Lateran. They made such a profound impression that Pope Pius IV requested them as the exclusive property of the papal chapel, where, ever since, they have been performed every year on Good Friday. Although the master's life was by no means free from vicissitudes and petty annoyances, he lived to see his work and genius appreciated, and when he died in Rome on Feb. 2, 1594, his contemporaries realized that the greatest master who had appeared up to that time in the history of music had passed away.

In the works of Palestrina the highest aspirations of an entire art epoch find their noblest expression. The music is written entirely in the mediæval Church modes (see MODES) and exhausts the possibilities of that style. One must not expect emotional music in the modern sense. The very impossibility of emotional expression in the old modes led subsequently to their disuse and the adoption of our major and minor modes. The Palestrina style is severe, noble, and majestic, eminently suited to the expression of lofty, religious sentiment. What Bach is to modern music Palestrina is to the older music. His influence has been enormous. Just as Wagner put an end to the false pathos and trivialities of dramatic composers, so Palestrina dealt the deathblow to the canonic trickeries into which the great Flemish school had degenerated. Against theirs Palestrina's style means a return to simplicity, but the simplicity of genius, which produces the sublimest effects without apparent effort. His stupendous contrapuntal technic is never displayed, but only employed as a legitimate means towards artistic ends; and in all his works he pays the greatest attention to the proper declamation and enunciation of the words by careful avoidance of meaningless melismas. Under the able editorship of De Witt, Espagne, Commer, and Haberl Palestrina's complete works were published in 33 volumes by Breitkopf and Härtel (1862–1903). Consult: G. Baini, *Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina* (Rome, 1828); G. Felix, *Palestrina et la musique sacrée, 1594–1894* (Paris, 1895); A. Cametti, *Cenni biografici di G. P. da Palestrina* (Milan, 1895); M. Brenet, *Palestrina* (Paris, 1905); J. Gloger, *Die Missa prima: eine Studie über den Palestrinastil* (Leobschütz, 1909).

PALESTRO, pȧ-lĕs'trō. A village in the Province of Pavia, Italy, on the Sesia, 34 miles west by south of Milan. It is famous as the scene of a battle between the allied Sardinians and French and the Austrians May 31, 1859, in which the latter were defeated with great loss. It has a ruined castle. Pop. (commune), 1901, 3498; 1911, 3273.

PALEY, pā'lĭ, Frederick Apthorp (1815–88). An English classical scholar, born at Easingwold, near York. He was educated at St. John's College, Cambridge, where he lived from 1838 to 1846, when he left the university on account of his conversion to the Roman Catholic faith. Subsequently (1860) he returned to Cambridge, and remained there until in 1874 he was elected professor of classical literature in the Roman Catholic College at Kensington. He was classical examiner to Cambridge, London University, and the Civil Service Commission. A tireless student, he prepared numerous thoroughgoing and discriminating editions of the classics, including editions of Æschylus, Euripides, Aristophanes, Hesiod, Propertius, and Pindar. It was chiefly as a verbal critic that he won recognition, and his original compositions in Latin and Greek were far superior to his few English renderings. Besides his literary studies, which attracted much attention in Germany, he published works on ecclesiastical architecture, including an excellent *Manual of Gothic Mouldings* (1845). Consult J. E. Sandys, *A History of Classical Scholarship,* vol. iii (Cambridge, 1908).

PALEY, William (1743–1805). An English divine, born at Peterborough in July, 1743. He entered Christ's College, Cambridge, as a sizar at 16, and for the next two years led a dissipated life, but thereafter became a severe student, and took his bachelor's degree in 1763 with the highest honors. After teaching in a school for three years he was elected a fellow and afterward a tutor of Christ's and was ordained in 1767. In 1776, upon his marriage, he was obliged to give up his fellowship and became rector of Musgrave and later vicar of Dalston in Cumberland. In 1780 he was collated to a prebendal stall in the cathedral church of Carlisle; in 1782 he became Archdeacon and in 1785 Chancellor of the diocese. The last of these years witnessed the publication of his *Principles of Moral and Political Philosophy.* In this work he propounds his ethical theory, which is a most remarkable mixture of utilitarianism and theology. Virtue was defined as "the doing good to mankind in obedience to the will of God and for the sake of everlasting happiness." The will of God is discoverable "from Scripture and the light of nature combined." The light of nature is the tendency of actions to promote human happiness, the benevolence of the Deity being supposed. In 1790 appeared the *Horæ Paulinæ,* in which he aims to prove, by a great variety of "undesigned coincidences," the improbability, if not impossibility, of the hypothesis that the New Testament is a "cunningly devised fable." *A View of the Evidences of Christianity* was published in 1794. In his own day he was held to have achieved a splendid triumph over skeptics, and was handsomely rewarded. Several preferments came to him in rapid succession, until finally he obtained the rich rectory of Bishop Wearmouth (worth £1200 per annum). After 1800 he became subject to a painful disease, but he continued to write, and in 1802 published perhaps the most widely popular of all his works, *Natural Theology, or Evidences of the Existence and Attributes of the Deity,* which, however, was to a large extent borrowed from a Dutch work. In natural theology he is well known on account of his argument from design to the existence of God. Paley died May 25, 1805. A complete edition of his works was published in 1825 by one of his sons, the Rev. Edmund Paley. There are biographies by Meadley (London, 1809) and Lynam (ib., 1825). Consult Leslie Stephen, *History of English Thought in the Eighteenth Century* (3d ed., New York, 1902), and Ernest Albee, *History of English Utilitarianism* (ib., 1902).

PALFREY, păl'frĭ, Francis Winthrop (1831–89). An American historian, born in Boston, son of J. G. Palfrey. He graduated at Harvard in 1851 and at the Law School two years afterward. During the Civil War he rose to the rank of colonel and brevet brigadier general, and in 1872 he was appointed register in bankruptcy. He published *A Memoir of William F. Bartlett* (1879); *Antietam and Fredericksburg,* in the "Campaigns of the Civil War Series" (1882); and contributed to the first volume of *Military Papers of the Historical Society of Massachusetts* and to the *North American Review.*

PALFREY, John Gorham (1796–1881). An American theologian and historian. He was born in Boston, May 2, 1796, graduated at Harvard in 1815, and studied for the ministry. In 1818 he was called to the pulpit of the Brattle Street Church (Congregational Unitarian), Boston, and in 1830 to the chair of sacred literature at the Harvard Divinity School, where he remained till 1839. He was editor of the *North American Review* (1835–43), and in 1839 and 1842 gave a course of lectures before the Lowell Institute, Boston, on *The Evidences of Christianity,* which appeared in book form the next year. He was a member of the House of Representatives of the Massachusetts Legislature, 1842–43, and Secretary of the Commonwealth, 1844–48. He entered Congress as a Whig in 1847. He had already opposed the extension of slavery in a series of articles called *The Progress of the Slave Power* (1846), and in December, 1847, he declined to vote for Robert C. Winthrop, the Whig candidate for Speaker. This step, with his well-known antislavery principles, cost him his seat at the election of 1848, after a close contest. He soon joined the Free-Soil party, was one of the editors of the *Commonwealth,* the Massachusetts organ of that party, and their candidate for Governor. He died in Cambridge, April 26, 1881. Dr. Palfrey published *Lectures on the Jewish Scriptures and Antiquities* (1838–52); *Sermons* (1834); *Elements of Chaldee, Syriac, Samaritan, and Rabbinical Grammar* (1835); and *The Relation between Judaism and Christianity* (1854). But his reputation now rests upon his *History of New England during the Stuart Dynasty* (1858–75), abridged as *A History of New England from the Discovery by Europeans to the Revolution of the Seventeenth Century* (1866), again under title *A Compendious History of New England, from the Discovery by Europeans to the First General Congress of the Anglo-American Colonies* (4 vols., 1873). The closing part of the fourth volume in this edition was incomplete, and a fifth volume was published, *History of New England from the Revolution of the Seventeenth Century to the Revolution of the Eighteenth Century,* edited by his son, F. W. Palfrey (1890).

PALGHAT, pạl'gạt'. A town and railway station in the District of Malabar, Madras, India, on the south slope of the Nilgiri Hills, 26 miles southwest of Coimbatore (Map: India, C 7). It is at the foot of the Palghat Pass, which connects Travancore and Malabar by a military road and the Madras Railway. It has an extensive trade in grain, tobacco, timber, oil, and cloths, and is noted for its educational institutions, including the Victoria Jubilee College (affiliated with Madras University), a law library, and a Swiss Protestant mission. Anciently of strategic value, Palghat was captured by the British in 1768, since when its military importance has declined, and its fortress, which still exists, has been abandoned. Pop., 1901, 44,177; 1911, 44,310.

PALGRAVE, pạl′grâv, Sir Francis (1788–1861). An English historian. He was born in London of Hebrew parentage, his father, Meyer Cohen, being a member of the stock exchange. After receiving a private education he studied law, was called to the bar at the Middle Temple in 1827, and for a time was prominent in pedigree cases before the House of Lords. In 1823 he married, and on that occasion changed his faith and assumed the maiden name of his wife's mother, Palgrave. He became known as a literary antiquary by publishing some Anglo-Norman chansons. Gradually, however, he turned to the study of English history, and in 1831 published a *History of England: Anglo-Saxon Period*. In 1832 appeared his best work, the *Rise and Progress of the English Commonwealth: Anglo-Saxon Period*, and in the same year Palgrave also received the honor of knighthood. In 1838 he was appointed deputy keeper of her Majesty's records and held this office until his death. To him were due the gathering of the valuable records and their removal from their various insecure repositories to the great Public Record Office. In 1851 Palgrave published the first volume of his *History of Normandy and of England*, but most of the work appeared after his death, which took place on July 6, 1861. As deputy keeper of the records he published 22 annual reports. He also edited for the Record Commission the following works: *The Parliamentary Writs* (1827); *Essay on the Original Authority of the King's Council* (1834); *Rotulæ Curiæ Regis* (1835). Sir Francis Palgrave was the father of Francis Turner, William Gifford, Robert Harry Inglis, and Reginald Francis Douse Palgrave (qq.v.).

PALGRAVE, Francis Turner (1824–97). An English poet and critic, son of Sir Francis Palgrave. He was born at Great Yarmouth, was educated at Charterhouse and in Balliol and Exeter colleges, Oxford, served for five years as vice principal of the training college for schoolmasters at Kneller Hall, and afterward until 1884, when he retired, was successively examiner and assistant secretary in the education department. In 1885 he succeeded John C. Shairp in the Oxford professorship of poetry. He was the author of *Idylls and Songs* (1854); *Essays on Art* (1866); *Hymns* (1867); *Lyrical Poems* (1871); and *Landscape in Poetry* (1897); but is best known as the scholarly editor of such admirable collections as the *Golden Treasury of English Lyrics* (1861); *Sonnets and Songs of Shakespeare* (1877); *Selected Lyrical Poems of Herrick* (1877); *Selected Lyrical Poems of Keats* (1855); and the *Treasury of Sacred Song* (1889).

PALGRAVE, Sir Reginald Francis Douse (1829–1904). An English writer, born in London, June 28, 1829. He was educated at Charterhouse School and became a solicitor in 1851. Entering the committee office of the House of Commons as a clerk in 1853, he was appointed examiner of petitions for private bills to both Houses (1866), then second clerk assistant (1868–70), and clerk assistant (1870–86), and finally clerk of the House of Commons (1886–1900). He was knighted in 1892. His books include: *The House of Commons: Illustrations of its History and Practice* (1869); *The Chairman's Handbook* (1877); *Oliver Cromwell* (1890), a fantastic study of the subject of the book. He also edited the first two books of Sir T. E. May's *Treatise on the Law of Parliament* (1893).

PALGRAVE, Sir Robert Harry Inglis (1827–). An English economist. He was born at Westminster, was educated at the Charterhouse, and went into banking. From 1877 to 1883 he edited *The Economist*. He was knighted in 1909. Palgrave wrote: *The Local Taxation of Great Britain and Ireland* (1871); *Notes on Banking* (1873); *Bank Rate and the Money Market in England, France, Germany, Holland, and Belgium, 1844–1900* (1903); *An Enquiry into the Economic Condition of the Country* (1904); and contributions to the *Dictionary of Political Economy* (3 vols., 1894–99; 3d ed., 1915 et seq.), of which he was editor.

PALGRAVE, William Gifford (1826–88). An English traveler and diplomatist. He was born in London, won the Charterhouse medal for classical verse, and obtained an open scholarship at Trinity College, Oxford. He served in the Indian army as a lieutenant in the Eighth Bombay native infantry. In 1853 he resigned his commission, entered the Jesuit Order, and after courses of study at Laval and Rome, voluntarily joined the Syrian mission. Here he acquired such knowledge of Arabic language and manners as to be able thereafter to pass as a native. This guaranteed his safety in a perilous expedition through central Arabia (1862–63), undertaken under commission of Napoleon III and described in the admirable *Narrative of a Year's Journey* (1865). Having withdrawn from the Jesuit Order, in 1865, he went on a special governmental mission to Abyssinia, held various consulates in 1866–79, and in 1884 received appointment as Minister Resident to Uruguay, where he died. Palgrave was a remarkable linguist. Some years before his death he became deeply interested in Oriental religions, especially the Shintoism of Japan, but he died in the Roman Catholic faith. Among his works are: *Essays on Eastern Questions* (1872); *Hermann Agha* (1872); *Dutch Guiana* (1876); *Ulysses; or Scenes and Studies in Many Lands* (1887); *A Vision of Life* (1891), a religious poem.

PALI, pä′lė (Skt., line, series, sacred text). The language and literature of primitive Buddhism (q.v.), now represented in Ceylon, Burma, and Siam. Strictly speaking, Pali is the name of the literature only, which is so called because it is regarded as a series of sacred texts. The language itself was called *Pālibhāsā*, 'language of the series,' or *Māgadhī bhāsā*, 'language of Magadha' (q.v.). It appears, however, to have formed a linguistic belt along the northern slope of the Vindhya Mountains. It is not impossible that its centre was in the city of Ujjain (q.v.), where the first great patron of Buddhism, Aśoka (q.v.), had been Governor before he ascended the throne, yet the religious associations of Pali are all connected with the Kingdom of Magadha, whose capital was Pataliputra (modern Patna). Thence the language was carried to Ceylon by the Buddhist missionaries. Pali may be divided into two groups, that of the inscriptions and that of the literature. Of these the inscriptional Pali is the older. Its earliest records in India are in the inscriptions of Aśoka and date from the third quarter of the third century B.C., and the youngest are as late as the tenth century A.D. In Ceylon the oldest inscriptions cannot be dated before the first century B.C. The relation of Pali to the other languages of India is in some respects uncertain. It is clear, however, that it is not a corruption of classical Sanskrit, but is descended from a dialect closely akin to Vedic Sanskrit. (See Sanskrit Language.) There is much evidence for the view that Pali was the language of India between the Himalaya and the Vindhyas before the rise of classical Sanskrit. Sanskrit inscriptions are not common before the first century B.C., and it was not until the fourth century A.D. that Pali inscriptions, except for a few, chiefly archaistic in character, were superseded by those in Sanskrit. Many proper names in Megasthenes (about 300 B.C.) and other classical authors are evidently Pali, while others are as plainly Sanskrit. Epigraphical evidence further leads to the view that the classical Sanskrit originated in the region which was bounded by the Ganges and the Jumna, and which stretched between these rivers from the Himalaya to Muttra. From this country classical Sanskrit spread, superseding Pali and the other Indo-Germanic folk dialects of India. On the other hand, it must be borne in mind that classical Sanskrit was at an early date a language of high culture, and that it was fixed in its literary form by Panini (q.v.) as early as 300 B.C. Again, the resemblances between Pali and Prakrit (q.v.) are so close that Pali may be regarded merely as a Prakrit dialect (see Prakrit), and the Prakrits long survived as literary and doubtless also as spoken languages, so that not only is Prakrit found in the Hindu drama, but we have a collection of Prakrit poems by Hala, probably about 1100 A.D. It would appear, therefore, that Pali and the later Prakrits existed contemporaneously with classical Sanskrit, which was the language of the higher classes and of literature, while Pali was vernacular and sectarian in use. Within Pali itself the existence of a number of dialects may be inferred from the epigraphical remains.

As contrasted both with Vedic and with classical Sanskrit, Pali, like Prakrit, shows a marked decadence both in phonology and in morphology. As a few of the most striking deviations from the Sanskrit phonology found in Pali, and frequently also in Prakrit, may be mentioned: the loss of *r*, as Sanskrit *vṛddha*, 'large,' Pali *vaddha, vuddha, buḍḍha, vuḍḍha*, Prakrit *vaddha, viddha, vuḍḍha;* the frequent change of dentals to cerebrals, as Sanskrit *dahati*, 'burns,' Pali *ḍahati*, Prakrit *ḍahaï;* the occasional change of *d* to *l*, as Sanskrit *dōhada*, 'longing of a pregnant woman,' Pali *dōhala*, Prakrit *dōhala, dōhaḍa;* the change of Sanskrit *ś, ṣ* to *s*, as Sanskrit *śōbhati*, 'is beautiful,' Pali *sobhati*, Prakrit *sōhaï*, Sanskrit *vṛṣabha*, 'bull,' Pali *vasabha*, Prakrit *vasaha;* the avoidance of consonant groups, usually by assimilation, but occasionally by the insertion of an epenthetic vowel, as Sanskrit *bhakta*, 'boiled rice,' Pali and Prakrit *bhatta*, Sanskrit *ślāghā*, 'praise,' Pali *silāghā*, Prakrit *salāhā*. Inflection in Pali closely resembles that of classical Sanskrit, except that the aorist, comparatively rare in classical Sanskrit, occurs not infrequently in Pali. Pali has no distinctive alphabet, but is written according to locality in Ceylonese, Burmese, or Cambodian script. The Devanagari (q.v.) writing is never employed.

Pali literature is almost entirely religious, and consists largely of the Buddhist scriptures together with commentaries on these. In extent the theological texts exceed the compass of the Christian Bible and are divided into Three Testamenta, *Tripiṭaka* (in Pali, *Ti-piṭaka*), literally 'Three Baskets.' The first Pitaka is the Discipline Basket (*Vinaya-piṭaka*), containing rules and regulations to be followed by the Buddhist order of monks. The second Pitaka is the Sermon Basket (*Sutta-piṭaka*), recording discourses delivered by the Buddha to his disciples. The third Pitaka is the Metaphysical Basket (*Abhidhamma-piṭaka*), abstruse in character, as its name implies. Each of these Pitakas comprises a number of separate books, and the commentaries connected with these have also a special value for the study of Buddhism.

Of much importance among the general works are the *Visuddhimagga*, or Way of Purity, by Buddhaghosa, a treatise on Buddhist doctrine dating from the fourth century A.D., and the *Milindapañha*, or Questions of Milinda (q.v.), which was probably composed about the beginning of the Christian era. There are further a number of historical works, which have an increased interest from the fact that Sanskrit literature (q.v.) is almost without authentic histories. Among the most important works of this class in Pali are the *Mahāvansa* (q.v.), or Great History, and the *Dīpavansa* (q.v.), or History of the Island (of Ceylon). There is an abundant literature besides, including not only religious and historical writings, but also metrics, grammar, and lexicography.

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PALICI, pȧ-lē'chē, Lago Dei. See Naftia.

PALIKAO, pȧ'lē'kȧ'ō', Charles Guillaume Marie Cousin-Montauban, Count of (1796–1878). A French general. He served in Spain and Africa, and commanded the English and French forces in the campaign of 1860 against China, for which he received the title of Count of Palikao (a place east of Peking), where he gained a decisive victory, after the fall of Peking. He was charged with plundering the Imperial summer palace, but it seems that he did not.

In August, 1870, on the resignation of the Ollivier ministry, after the first reverses of the French, he was charged by Napoleon with the formation of a new ministry. He took charge of the nation's defenses and in 24 days placed 140,000 men in the field, besides arming the capital. After Sedan the dictatorship was offered to him, but he preferred a plan to be lieutenant general of a council of national defense and, when this was found impracticable, withdrew to Belgium. He did not reënter politics. His book, *Un ministère de la guerre de vingtquatre jours* (1871), describes his experiences.

PALIL′IA, or **PARILIA**. An ancient Roman feast in honor of Pales (q.v.).

PAL′IMPSEST (Lat. *palimpsestus*, from Gk. *παλίμψηστος*, scraped again, from *πάλιν*, *palin*, again + *ψηστός*, *psēstos*, scraped, from *ψῆν*, *psēn*, to rub smooth). The name given to parchment, papyrus, or other writing material, from which, after it had been written upon, the first writing was wholly or in part removed in order that the page might be made available a second time. The ink used on papyrus and sometimes on parchment was commonly of soot mixed with gum and thinned with water, or else the liquid of the cuttlefish. This could be washed out with a sponge, and the latter was part of the writing equipment. Where this ink has been used, there is usually no trace of the original writing if the manuscript has been used again. Later, for parchment, ink made from gall apples, sometimes with the addition of vitriol or metallic substances, was used. This took hold of the vellum (see PALEOGRAPHY, *Materials*) and for removal required the use of pumice or of a mixture of milk, cheese, and lime to soften the parchment. Sometimes the knife was used, of course to the complete destruction of the writing. The processes employed were not always very complete, nor were they carefully carried out, and as a result in a number of cases the earlier writing is still more or less legible. The fragile character of papyrus made it difficult, if not impossible, to wash out writing of long standing, though the sponge was probably used while the ink was fresh. Since on papyri, as a rule, the writing was only on the *recto*, the back was frequently used to receive later writing. In the case of parchment, especially when bound in books, erasure was needed for a second use. The practice was common in classical times and is frequently mentioned in the ancient writers, though in some cases the reference may well be to erasure of writing on wax tablets. In general these old palimpsests were used as notebooks or for rough drafts. The relative scarcity and cost of papyrus or vellum undoubtedly was responsible for this custom, and, with the disuse of papyrus and increasing demand for parchment, the habit of using old books increased in the East and the West. Though vellum began to supersede papyrus for important works in the fourth century of our era, it was not till the seventh century, when the Arab conquest shut off the supply of papyrus, that it became practically the only material in use, and it is from that time that palimpsests begin to increase. In the East, in 691, a Greek synod forbade the destruction of manuscripts of the Bible or of the fathers unless they were already damaged. In the West much use was made of old manuscripts from the seventh to the ninth century, when, in consequence of the disturbed state of the country, there was some scarcity of material, and the old volumes of neglected authors were used for more popular works. Some writers have ascribed this to the indifference and even to the hostility of the monks and clergy to classical literature, and have attributed to their reckless destruction of classic manuscripts, in order to provide material for their own service books and legendaries, the deficiencies in the remains of ancient learning which scholars have now to deplore. That some part of the loss may have so arisen it is impossible to doubt, although it is equally certain that we owe to the mediæval monks and clergy the preservation of a large part of the surviving ancient literature. Moreover, it seems probable that in general damaged copies were drawn upon for palimpsests, and in some cases the writing was not erased till the sheets had been resewn. It is said that no palimpsest shows that it originally contained a complete work under the later writing, though in some cases the amount preserved is very large. It should also be noted that in not a few cases parts of the Bible or of the Church fathers are found under classical or late texts, so that convenience, not hostility, seems in general to have determined the choice of material for erasure. While the practice continued even down to the sixteenth century, and in at least one case cleaned parchment was used for a printed book, most of the valuable Latin palimpsests are earlier than the tenth century, when it was possible to use the fine parchment of earlier times. In the East the practice was much more general, and the best palimpsests are of a later period. In fact, it is said that a relatively large proportion of existing Greek manuscripts are on reused vellum. While many of these are of Eastern manufacture, not a few show that the upper writing was done in Italy and the West. The natural result of these factors is that in general the palimpsests yield fragments whose value lies largely in testimony to the early state of the text. In biblical criticism some very important results have been obtained from early palimpsests, and in classical literature such palimpsests as the Codex Ambrosianus of Plautus have unique value. Most important of course are the rare cases where a lost work may be recovered from a palimpsest, as in the case of the *Republic* of Cicero or the *Institutes* of Gaius.

It will easily be understood, therefore, that the chief, if not the sole, interest of palimpsest manuscripts lies in the ancient writing which they had contained, and that their value to literature mainly depends on the degree of legibility which the ancient writing still retains. Very commonly the original writing is much larger than the modern; the modern lines and letters do not cover those of the old manuscript, but follow the same order. In other specimens the new writing is transverse, and in some the old page is turned upside down. Sometimes, where the old page is divided into columns, the new writing is carried over them all in a single line; sometimes the old page is doubled, so as to form two pages in the new manuscript. Sometimes it is cut into two or even three pages. The most perplexing case of all for the decipherer is that in which the new letters are of the same size and are written upon the same lines with those of the original manuscript. In the case of Latin palimpsests it is generally true that lower minuscule writing, when legible at all, is scarcely worth the trouble of reading. The valuable manuscripts are in capitals or uncials. Some variety also is found in the language of the palimpsests. In those which were originally found in the Western libraries the new writing is almost invariably Latin, while the original is sometimes Greek, sometimes Latin. In the palimpsests discovered in the East the original is commonly Greek, the new writing being sometimes Greek, sometimes Syriac, sometimes Armenian.

The possibility of making use of palimpsest manuscripts in order to increase our store of ancient literature was suggested as far back as the days of Montfaucon (q.v.), but the idea was not turned to practical account till the latter part of the eighteenth century. The first palimpsest editor was a German scholar, Dr. Paul Bruns, who discovered that one of the Vatican manuscripts was a palimpsest, the effaced matter of which was a fragment of the ninety-first book of Livy's *Roman History*, and printed this fragment at Hamburg in 1773. In the field of discovery thus opened by Bruns but little progress was made until the following century, when Barrett of Trinity College, Dublin, published his palimpsest fragments of St. Matthew, and when palimpsest literature rose to importance in the hands of the celebrated Angelo Mai (q.v.). The great historian Niebuhr about the same time applied himself to the subject and was followed by Blume, Pertz, Gaupp, Mommsen, Studemund, and other German scholars, whose labors, however, were for the most part confined to the department of ancient Roman law. Tischendorf's (q.v.) labors drew attention to the biblical texts thus preserved, and Cureton's examinations of Syriac and other Eastern manuscripts showed the importance of this field, where the most valuable result was the discovery in the monastery at Mount Sinai of an early Syriac version of the Gospels under some lives of female saints.

Greek Palimpsests. Among these the first place in importance belongs to the biblical palimpsests, the earliest of which was *Fragments of the Gospel of Saint Matthew*, in facsimile as well as in ordinary type, printed from a palimpsest manuscript of Trinity College, Dublin, by Barrett (Dublin, 1801). The original writing appears to be of the sixth century. Barrett's transcript of the text was not in all respects correct, and a revised edition was published by Abbott in 1880. It is chiefly, however, to a collection of Syriac manuscripts brought from the East that we are indebted for the more recent palimpsest restorations of the ancient biblical readings. In this line the chief discoverer has been Tischendorf. Of these the best known is the celebrated *Codex Ephremi*, in the National Library, Paris. This manuscript had been early observed to be palimpsest, and the original Greek text was collated by Wetstein in 1716. It was completely published by Tischendorf, the New Testament in 1843 and the Old in 1845. The modern writing of this palimpsest consists of a Greek translation of works by St. Ephrem the Syrian. Another palimpsest of interest is the *Codex Nitriensis*, in the British Museum, containing part of the Gospel of St. Luke from the sixth century, part of the *Iliad* of about the same date, and a somewhat later Euclid, all used by a monk of the Nitrian monastery for a copy of a Syriac treatise. The number of these fragments constantly grows, and now probably about 30 Greek, Old Latin, and Gothic biblical palimpsests are known, of which the majority are Greek. As most of them belong to the fifth or sixth century, their testimony is often of great value.

In Greek classical literature the results from the palimpsests are not great. The Homer fragments are older than other parchment codices, but are outranked by the numerous papyri. A small part of the *Phaëthon* of Euripides is preserved in the *Codex Claromontanus* at Paris, and a collection of extracts from the later historians, containing some passages from lost works, was published by Mai in his *Scriptorum Veterum Nova Collectio* (Rome, 1825–38). In Greek, however, no such discoveries have been made as in Latin, though it should be said that the Eastern libraries contain many palimpsests not yet carefully examined.

Latin Palimpsests. The first fragment of Latin literature printed from a palimpsest original is the portion of the ninety-first book of *Livy*, already referred to, published at Hamburg and also at Rome in 1773. It was reëdited in a more complete form by Niebuhr in 1820. Of the Latin palimpsests edited by Mai, the earliest were some fragments of lost orations of Cicero from two different palimpsests in the Ambrosian library at Milan, in the later of which the second writing consisted of the acts of the Council of Chalcedon. These orations were published in two successive volumes in 1814. He also published eight orations of Symmachus (1815) and the comedies of Plautus, including a fragment of the lost play entitled *Vidularia* (1815). This is the celebrated *Codex Ambrosianus* in Milan, which has since been studied by Ritschl and other Plautine scholars, notably Studemund (Berlin, 1889). Mai likewise edited the works of M. Cornelius Fronto, together with the epistles of Antoninus Pius, Lucius Verus, M. Aurelius, and others (1815), as well as the celebrated dialogue of Cicero, *De Republica*, from a palimpsest of the Vatican, the modern writing on which is the commentary of St. Augustine on the Psalms (1821). Soon after the *De Republica* he published another volume from palimpsest sources, the most important of whose contents were some fragments of ancient Roman law, which prepared the way for the more distinguished success of Niebuhr, who in a palimpsest of the library of Verona recognized a portion of an ancient work on Roman law, afterward identified as the *Institutiones* of Gaius. The text was deciphered by Göschen and others, and the first edition published at Berlin in 1820. A careful new collation was published by Studemund in 1874, and a text edition carefully revised by Krüger and Studemund (4th ed., Berlin, 1899). On this same palimpsest we find the *Fasti Consulares* of 486. The latest considerable Latin publication in this department is *Gai Granii Liciniani Annalium Quæ Supersunt* (Berlin, 1857), edited from a palimpsest of the British Museum by the younger Pertz. This palimpsest, as was already stated, is a thrice-written codex, the earliest and original contents being the *Annales* of Granius Licinianus, a writer of the second century A.D. The second writing was also in Latin, and the work is a grammatical treatise, of which the chapters *De Verbo* and *De Adverbio* are still legible. The most modern writing is Syriac, written in the cursive character.

It will be gathered from the above that the ancient works recovered by means of palimpsest manuscripts are all fragmentary, and one might be led to rate at a low value the result thereby obtained. Yet such works as the *Republic* of Cicero, the *Institutes* of Gaius, and the very early text of Plautus in the Ambrosian palimpsest are of priceless value. And it must be remembered that in some of the departments to which these palimpsestic fragments belong every scrap, no matter how trifling, has an independent value. In biblical remains, e.g., a single text may present a valuable reading, the merest fragment may throw light on an important critical question. In history, in like manner, a small fragment may disclose an interesting fact, or supply a significant commentary upon facts otherwise ascertained. And as regards critical uses especially, it must not be forgotten that the obliterated text of the palimpsest manuscripts for the most part far exceeds in antiquity the very oldest known codices which we possess and is probably second only in age to the papyri of Herculaneum.

The method of treating palimpsest manuscripts with a view to deciphering their contents has been fully described by different editors. Mai, after having washed the palimpsest with an infusion of galls, exposed it to the light and air and, generally speaking, found this sufficient for his purpose. Peyron washed the parchment in water, afterward in dilute muriatic acid, and finally in prussiate of potash. A mixture compounded on this principle is called from its inventor, M. Gioberti, *tinctura Giobertina*. Sometimes the treatment does not succeed equally well on both sides of the parchment, the outer surface, from its softer texture and more thorough erosion, yielding poorer results. When the ink contained animal substances, as milk, or the blood of the cuttlefish, Mone plunged the parchment into a close vessel filled with oil, which he heated to a temperature of 400° R. But almost, if not quite, all of the earlier processes have resulted, after the course of some years, in such darkening and sometimes corrosion of the surface of the manuscripts treated as to make them quite illegible and worthless. Von Sickel recommended an apparently harmless process, that of washing the pages of the manuscript discreetly with a potash soap and then immersing them in clear water, from which treatment they take no injury if they are carefully dried afterward. Pringsheim published the details of a process purely photographic, whereby, through successive photographings, the effect on the plate of the later writing is weakened, and that of the earlier and fainter hand is intensified, until the erased writing becomes legible in the negative.

Consult: Mone, *Lateinische und griechische Messen* (Frankfort, 1850); id., *De Libris Palimpsestis tam Latinis quam Græcis* (Karlsruhe, 1855); Wattenbach, *Das Schriftwesen im Mittelalter* (3d ed., Leipzig, 1896); H. W. Johnston, *Latin Manuscripts* (Chicago, 1897); E. M. Thompson, *An Introduction to Greek and Latin Palæography* (Oxford, 1912). See GIOBERTINE TINCTURE; PALEOGRAPHY.

PAL'INDROME (Gk. παλίνδρομος, *palindromos*, a running back, from πάλιν, *palin*, back + δρόμος, *dromos*, a running, from δραμεῖν, *dramein*, to run). A name given to a kind of verse the peculiarity of which is that it reads the same backward as forward. It is very common in Latin. Examples are:

Si bene te tua laus taxat sua laute tenebis.
Et necat eger amor non Roma rege tacente,
Roma reges una non anus eger amor.

In this, *eger* is the mediæval spelling for *æger*. To a Roman lawyer is credited the following:

Si nummi immunis,

which Camden translates:

Give me my fee, and I warrant you free.

One attributed to Napoleon is:

Able was I ere I saw Elba.

Consult Wheatley, *Anagrams* (Hartford, 1862), and Clark, *Palindromes* (Glasgow, 1887).

PAL'INGENE'SIA (ML., from Gk. παλιγγενεσία, new birth, from πάλιν, *palin*, again + γένεσις, *genesis*, birth). Apart from its simple sense of restoration, renewal, the term came to be used in two more special senses—one of individuals, referring to their spiritual regeneration viewed in several lights, as reincarnation or otherwise, and the other of the universe in general, referring to its renewal after destruction, especially in view of the eschatological ideas current in the ancient world and in particular among the Jews. Both of these senses are represented in the two occurrences of the word in the New Testament, the first in Titus iii. 5 and the second in Matt. xix. 28. The equivalent term "palingenesis" has been frequently used in philosophy, both ancient and modern, in various senses.

PAL'INGEN'ESIS (Neo-Lat., from Gk. πάλιν, *palin*, again + γένεσις, *genesis*, birth), and **CENOGENESIS.** The recapitulation theory (q.v.) or "biogenetic law" is a statement of the general fact that the development of the individual is an epitome of that of the class to which it belongs. Haeckel, and Fritz Müller in substance before him, further distinguished two modes of operation of this law. To the first he gave the name "palingenesis." Briefly defined, it is the fact of the regular repetition of ancestral features caused by inheritance. Thus, the shrimps and crabs in the egg pass through a nauplius stage, the embryo possessing the rudiments of only three pairs of appendages, but they hatch in an advanced larval condition called the zoëa. The lobster, on the other hand, before hatching passes through phases which recall the nauplius and also the zoëa stages, and the animal hatches in a more advanced stage than the zoëa, undergoing a partial metamorphosis. The toad and frog, in the embryo, pass through an ascidian, an *Amphioxus*, a fish, and a salamander stage before they assume the tailless adult condition. The animal thus repeats in its own development certain (but not all) of the features which characterized its successively ascidian, *Amphioxus*-like, and fishlike ancestors.

The second phase or mode of operation of the law of recapitulation is "cenogenesis," which means the modification of palingenesis by the inheritance of later acquired characters, the ancestral characters having been lost or crowded out, owing to the lapse of heredity. This was fully explained by Fritz Müller, his illustration being the metamorphosis of the more specialized insects, such as the butterfly, bee, and fly. The larval stages of these insects (caterpillar, maggot) are secondary. The most primitive insects were born in the shape of the parent and passed through no larval stage. The primitive features of the ancestral insect have been lost, except the transitory indications of a series of abdominal legs, showing that the insects all descended from polypodous forms; but the caterpillar and maggot-stages are recent acquisitions, and to this phenomenon the term "cenogenesis" (or recent genesis) is applied. As Müller expressed it, in contradistinction to the *inherited* metamorphosis of the prawns, we may call that of the Coleoptera, Lepidoptera, etc., an *acquired* metamorphosis. He then goes on to show at some length that the "complete" metamorphosis of insects was not inherited from the primitive ancestor of all insects, but acquired at a later period. See Recapitulation Theory.

Consult: Ernst Haeckel, *Generelle morphologie* (Berlin, 1866); Fritz Müller, *Facts for Darwin* (London, 1869); Alpheus Hyatt, *Phylogeny of an Acquired Character* (Philadelphia, 1894); Arnold Lang, *Textbook of Comparative Anatomy*, English translation by Bernard, vol. i (New York, 1891).

PALINURO, pä'lê-nōō'rô, Cape, or Cape Spartivento. A promontory on the coast of Lucania, Italy, projecting into the Tyrrhenian Sea, northwest of the entrance to the Gulf of Policastro. It forms a dangerous point to navigation. It was named in honor of Palinurus (q.v.), the pilot of Æneas, said to have been buried here, and here in 253 B.C. and in 36 B.C. Roman fleets were wrecked.

PAL'INU'RUS. A pilot of Æneas. When the Trojans were approaching the coast of Italy, he slept and fell overboard. The ghost of Palinurus appeared to Æneas on his visit to Hades and said that he had been washed ashore and murdered by the natives. In accordance with the promise of the Sibyl his body received suitable burial. Consult Vergil, *Æneid*, v. 833–871; vi. 337–383. See Palinuro, Cape.

PALISA, pä'lê-sȧ, Johann (1848–). An Austrian astronomer, born at Troppau. He studied mathematics and physics at Vienna and was assistant in the Vienna observatory (1870) and in the observatory at Geneva (1871) and director of the marine observatory at Pola until 1880. After this year he served as adjunct and then assistant director at the Vienna observatory. Before the use of photography Palisa discovered more than 80 asteroids and made special research on comets, mostly published in the *Astronomische Nachrichten* (1871 et seq.). His valuable charts based on observations were begun in 1878.

PAL'ISADE' CELLS (Fr. *palisade*, from *palisser*, to inclose with pales, from OF. *palisse, pallise, palice*, from ML. *palitium*, paling, from *palus*, pale). The green working cells (mesophyll) upon the dorsal side of a dorsiventral leaf, which become elongated at right angles to the plane of the leaf and, standing close together, without intercellular spaces, suggested the name. The dorsal surface of the leaf is exposed to more intense light than the ventral surface, and the palisade arrangement is a response to this exposure. In the case of erect (equitant) leaves and profile leaves, whose two surfaces are exposed alike, there are no palisade cells.

PAL'ISADES'. The name given to the line of cliffs that extend along the western shore of the Hudson River from near Haverstraw, N. Y., to Weehawken, N. J., a distance of about 30 miles. The cliffs for most of this distance rise almost directly from the water's edge in a single escarpment which simulates a wall of masonry and lends a characteristic and picturesque effect to the scenery in this section of the Hudson valley. Their height ranges from 200 to 550 feet. They are formed by the outcrop of a thick sheet of diabase which was intruded while in a molten condition between sandstones and shales of the Newark system. The overlying strata have been partially removed by erosion, and the harder igneous rock now stands exposed in the form of a ridge along the eastern edge of the sheet. The scarp wall of the Palisades is a complex fault (q.v.). Extensive accumulations of talus are found in places. The fissure through which the molten rock rose towards the surface is situated near the western edge of the sheet. The slope towards the west is for the most part very gradual. See Hudson River.

PALISOT DE BEAUVOIS, pȧ'lē'zô de bō'-vwä', Ambroise Marie François Joseph, Baron de (1752–1820). A French traveler and naturalist, born at Arras. Early a lawyer in Paris and later a high official in his native province, he afterward devoted himself to travel. He became a corresponding member of the Academy of Sciences in 1781 and five years later set out on a journey during which he visited West Africa, Santo Domingo, and North America. He returned to France in 1798, succeeded Adanson at the Institute in 1806, and in 1815 became a member of the council of the University of Paris. While visiting the West Indies he became involved (1790) in a controversy over the slave question with William Wilberforce and later (1814) with Thomas Clarkson (qq.v.). Palisot did not approve of slavery, but advised a gradual stoppage of the traffic, as in *Réfutation d'un écrit anonyme* (1814). Among his works are: *Flore d'Oware et de Bénin* (1804–21); *Insectes recueillis en Afrique et en Amérique* (1806–19); *Muscologie, ou traité sur les mousses* (1812); *Essai d'une nouvelle agrostographie* (1813). Palisot also wrote several dramas, among them the comedy *Railleur*.

PALISSY, pȧ'lē'sē', Bernard (c.1510–c.89). A celebrated French art potter, scholar, and author. He was born either near Agen (Lot-et-Garonne) or at Saintes. The details of his early life are uncertain, but he was apprenticed to a stained-glass painter and acquired a considerable knowledge in the natural sciences, which he extended by travels throughout France, in Flanders, and on the Rhine. In 1539 he settled at Saintes, where he practiced glass and portrait painting and land surveying. An enameled cup of faïence (probably some Oriental ware) which he saw by chance inspired him with the resolution to discover the mode of producing white enamel. He experimented for 16 years, exhausting all his resources until, unable any longer to buy fuel, he was reduced to burning his furniture piece by piece and finally the flooring of his rooms. Scoffed at by his neighbors, reproached by his wife, he nevertheless persisted in the search, and, although he never obtained the "white enamel" he sought, he at last invented a new kind of ware, superior in workmanship, originality of design, and brilliance of color to any previously produced in France. He became famous and was patronized by the royal family and the nobility, who employed him to embellish their mansions with grottoes of enameled faïence. The King gave him a patent as inventor of "figulines rustiques," and about 1562 he removed to Paris and set up his pottery works on a plot of ground assigned to him near the Tuileries. Though a stanch Huguenot, he was protected by Catharine de' Medici, and in 1575 began a course of lectures on natural history and physics which were attended by all the learned men of the day. Many of his views of nature have been supported by subsequent discovery and investigation. In 1588 he was thrown into the Bastille as a heretic and condemned to death, but died before the sentence was carried out. The faïence of Palissy is of a peculiar style. His figures and other ornaments are all executed in colored relief, the colors being usually rich yet subdued and not of great variety, blues, grays, and yellows prevailing. The best known of his productions are the "pièces rustiques," dishes ornamented with crayfish, frogs, lizards, fishes, snakes, shells, and plants, admirably true to nature in form and color, but rarer examples (J. P. Morgan collection, Metropolitan Museum, New York) are decorated with mythological figures more suited to the form of the plate. He also reproduced the pewter ewers and plateaux of Briot in enameled faïence. Fine specimens of his work are in the Louvre, the Musée de Cluny, at Sèvres, and in the J. P. Morgan collection. A few may be seen in the South Kensington and British museums and Wallace collection. His *Œuvres complètes*, edited by Cap in 1844 and again by Anatole France in 1880, containing also a most stirring autobiography, fully justify Lamartine's verdict giving Palissy a high position among French writers.

Bibliography. Henry Morley, *Palissy the Potter* (2d ed., London, 1855); Louis Audiat, *Bernard Palissy, étude sur la vie et ses travaux* (Paris, 1868); Ernest Dupuy, *Bernard Palissy, l'homme, l'artiste, le savant, l'écrivain* (new ed., ib., 1902); also Delange and Borneman, *Monographie de l'œuvre de Bernard Palissy* (ib., 1862); L. M. E. Solon, *History of Old French Faïence* (London, 1903); and H. Frantz, *French Pottery and Porcelain* (New York, 1906).

PALITZSCH, pä'lich, JOHANN GEORG (1723–88). A German astronomer, born at Prohlis, near Dresden. On Christmas night, 1758, he discovered, a month before any one else, the comet usually called Halley's and in 1782 simultaneously with Goodricke determined the period of variation in Algol (q.v.). Palitzsch made his own instruments and continued to live as a peasant in the country near Dresden.

PALIZZI, pȧ-lēt'sē, FILIPPO (1818–99). An Italian animal painter. He was born at Vasto in the Abruzzi and studied under Bonolis at Naples. Later he allied himself with Domenico Morelli (q.v.), with whom he became coleader of the Neapolitan Naturalist school, thus exercising a strong influence on the development of modern Italian art. He confined himself almost entirely to painting animals, which he reproduced with great truth and virility, but without much creative power or skill in composition. A room in the Modern Gallery at Rome is devoted to his original studies, made directly from nature, which he presented to the state in 1892.—His elder brother, GIUSEPPE (1812–89), also known as an animal painter, lived in Paris, where he studied under Troyon.

PALK (pạk) **STRAIT.** The northern portion of the passage between the south coast of Hindustan and the island of Ceylon (Map: India, D 7). This passage is continued southward by the Gulf of Manar (q.v.), from which it is separated by Adam's Bridge. It is from 40 to 80 miles wide, 80 miles long, and so shallow that it cannot be navigated in safety by large vessels.

PALL (Lat. *palla*, robe, mantle, curtain). A small square, generally of cardboard, covered on both sides with fine linen, which is used in the Roman Catholic church to cover the chalice during the mass. It seems to have evolved from a fold of the corporal (q.v.), which in earlier times was turned back over the chalice; this custom, which maintained itself as late as the twelfth century, is still preserved in the Carthusian Order, and a trace of it remains in the fact that the pontifical has no separate form for blessing the pall as distinct from the corporal. The Theatines use a second pall on which to lay the host; and in the Greek rite also two are used—one to cover the chalice, the other the paten. The name is also applied to a covering of black or purple (sometimes white for young persons) thrown over a coffin while it is being carried to burial.

PALL. A bearing in heraldry (q.v.). See also PALLIUM.

PALLA, păl'lȧ, or IMPALLA (South African name). A South African antelope (*Æpyceros melampus*), called rodebok by the Dutch because reddish. It is a wood-loving species and fond of water and in former days gathered into large herds in winter, when this species furnished the principal food of the lion and leopard. Consequently these antelopes were exceedingly suspicious and were not only hard to shoot but were likely to alarm all other game in the neighborhood by their shrill whistling as soon as they discovered the hunter. The genus is peculiar in having no dewclaws. The males alone have horns, which are lyrate with an abrupt angular bend in the middle.

PALLADINO, päl'lȧ-dē'nō̂, EUSAPIA (?–). An Italian spiritualistic medium. In 1894 she attracted much attention because of the remarkable psychic phenomena said to appear at her bidding. Several famous Spanish, French, and Italian professors tested her, and none of them detected any fraud, nor did leading members of the London Society for Psychical Research. Indeed, Sir Oliver Lodge published a report in the Society's *Journal* in November, 1894, in which he attributed supernatural powers to Madame Palladino. In 1895 she gave a series of séances at Cambridge, but was caught cheating many times. She visited the United States in 1909–10, gave several exhibitions, but was detected in the use of trickery by Professor Münsterberg.

PALLADIO, pȧl-lä'dē-ō̂, ANDREA (1518–80). An Italian architect of the late Renaissance, born at Vicenza. He studied architecture in his native city, his patron, Trissino, enabling him to visit Rome, where he prepared himself by a thorough study both of Vitruvius and of ancient monuments, which he assimilated more thoroughly than any other architect of the Renaissance. His first great work was the magnificent two-storied arcade around the basilica of Vicenza (1545). He produced many works of both civil and religious architecture in and near his native city, which he made a great architectural centre. His scientific treatise on architecture, *I quattro libri dell' architettura* (1570), attained immediate success. The precise rules and formulas, clearly expressed, carried his style not only throughout Italy but through Europe and Great Britain, where they found especial favor. Palladio became the standard bearer of late Renaissance architecture.

His strength lay rather in composition than in detail, and his originality was manifested in the knowledge, taste, and skill with which he reproduced the composition, proportions, and spirit of Roman architecture and adapted them to the requirements of his time. The basilica of Vicenza was epoch-making; so was his theatre (Teatro Olimpico). His palaces were equally characteristic. A few had two orders of columns, the finest of these being the Barbarano and Chiericati palaces in Vicenza; others, more numerous, a single colossal order on a rusticated basement, as in the Marcantonio Tiene Palace, which is finer even than the Porto and Valmarana palaces. Of his numerous villas the most famous is the Rotonda Capra, outside Vicenza, with circular hall in the centre and four Ionic porticoes; its interior ornaments in stucco are especially fine. In Venice his works were all ecclesiastical; the earliest was the atrium in front of the church of La Carità, the church itself coming later; then came the refectory and later the church of San Giorgio Maggiore, with its beautiful tower (the façade being of later date, by Scamozzi); in 1562 the façade of San Francesco della Vigna; and in 1578–80 the church of Il Redentore—all of them marked by great dignity and refinement of composition. His Vicentine buildings suffered from being executed in brick, stucco, and wood, instead of stone. The classic or Italian style introduced into England by Inigo Jones was directly inspired by the works of Palladio, from whose writings also Thomas Jefferson (q.v.) derived his architectural ideas carried out in the University of Virginia. Consult: Scamozzi, *Fabbriche di Palladio* (Venice, 1786); the monographs by Tommasso Temanza (Venice, 1762) and Boito (Milan, 1883), also Melani, in *L'Art* (Paris, 1890); and B. F. Fletcher, *Andrea Palladio, his Life and Works* (New York, 1902).

PAL'LADIS TAMIA. See MERES, FRANCIS.

PALLA'DIUM (Lat., from Gk. Παλλάδιον, *Palladion*). Among the Greeks, an image of the protecting divinity of a city, on whose preservation the safety of the town was believed to depend. In general these images seem to have had the form of armed figures, usually with shield and spear, of rude workmanship, often scarcely more than a mere column, but gradually assuming the type of the Athene Promachos, the colossal bronze statue on the Acropolis at Athens. They were early identified with that goddess, and their name is connected with hers (Pallas). Such images are seen even on Mycenæan gems and paintings and are frequent in later works of art. In literature the great example is the Palladium of Troy, believed to have fallen from heaven, like many another palladium or venerable cult image. This was stolen by Odysseus and Diomedes, and its subsequent fate was the subject of many different legends, since various cities desired to show that they possessed the original. With the acceptance by the Romans of the belief in their descent from the Trojans arose the belief stated by Varro that the Palladium, which was kept in absolute secrecy in the house of Vesta in the Forum at Rome, was the Trojan original and had been brought to Italy by Æneas. Consult Chavannes, *De Raptu Palladii* (Berlin, 1891).

PALLADIUM (Neo-Lat.). A metallic element discovered in 1803 by Wollaston, who named it from the planetoid Pallas, which had been discovered by Olbers in 1802. It is found in grains usually containing platinum and iridium in the proportion of about 2 per cent and with gold and silver in the proportion of 5 to 10 per cent, also with gold and lead selenide in the Harz. The principal sources are the nickeliferous copper ores of Ontario.

Palladium (symbol, Pd; atomic weight, 106.7) is a white lustrous metal with a specific gravity of about 12. It melts at 1546° C. (about 2815° F.) and is fairly malleable and ductile. It is remarkable for its capacity for absorbing hydrogen and for its powerful catalytic effects (see CATALYSIS); thus, it has been recommended for use in the combustion of organic substances in analytical work. The metal is used for making scales and division marks on scientific instruments and for coating and preserving silvered ware. Palladium wire finds some use in dentistry on account of its hardness. An alloy of palladium with steel is used in making certain parts of physical instruments.

Palladium combines with oxygen to form a monoxide (PdO), a dioxide (PdO_2), and a sesquioxide (Pd_2O_3), but none of its salts has any important application.

PALLA'DIUS. An early Christian writer. He is supposed to have been born in Galatia about 368, died before 431. At the age of 20 he started on foot to visit the cells of the famous monks in different parts of the Roman Empire. He spent some time in Egypt in the Nitrian desert, then went to Palestine, thence to his home in Asia Minor. At the beginning of the fifth century he was consecrated a bishop in Asia Minor, but he is probably not the Palladius who was Bishop of Helenopolis in Bithynia. He later spent some time again with the monks in Palestine. He was the author of a work addressed to Lausus, a chamberlain at the Imperial court, and hence called *Historia Lausiaca*, which is a rich collection of pictures of the monkish life in Egypt and Palestine, based on personal knowledge, oral testimony, and probably also written sources. The existing manuscripts differ greatly, and the text has not yet been established. It was published in the original Greek by Migne in *Patrol. Græca*, xxxiv, and in Latin translation in *Patrol. Latina*, lxxiii, lxxiv. Palladius was an adherent of Origen and an opponent of Jerome. He may also have been the author of a *Dialogus de vita S. Johannis Chrysostomi* (in Migne, *Patrol. Græca*, xlvii). Consult Preusschen, *Palladius und Rufinus* (Giessen, 1897). For a discussion of his *History*, consult Amélineau, *De Historia Lausiaca* (Paris, 1887), and Cuthbert Butler, "The Lausiac History," in *Texts and Studies*, vi (Cambridge, 1898, 1904).

PALLADIUS, PETER (1503–60). A Danish leader in the Reformation, born at Ribe. Aroused by the movement against Catholicism when rector at Odense (1530), Palladius went the next year to Wittenberg, studied for six years under Luther and Melanchthon, and obtained his doctorate in theology. He was called back in 1537 by Christian III, who made him Bishop of Zealand and professor of theology at the university. It was Palladius who introduced the Lutheran Reformation in Zealand, Norway, and Iceland. He visited his 390 churches, instructed the ministers, translated Luther's Little Catechism (1537), prepared a Church ritual and service book, and revised Christiern Pedersen's translation of the Bible (1550). He wrote 65 works on religion and the Reformation, in Latin or in Danish, the most notable being his *Visitatsbog* (1540). This was found in 1866 and was edited by A. C. L. Heiberg (1867), S. Grundtvig (1872), and by C. Rosenberg (1884). Palladius' Danish works were edited by Lis Jacobsen (1911 et seq.).

PALLADIUS, Rutilius Taurus Æmilianus. A Roman author, who lived probably in the fourth century A.D., under Valentinian and Theodosius. He wrote a work, *De Re Rustica* (On Agriculture), in 14 books, the last of which is a poem of 85 elegiac couplets. It is, from a literary and grammatical point of view, full of faults; but as it was a complete calendar of Roman agriculture, it was very useful for its time and was much read and followed during the Middle Ages. The best edition is that by Schneider in his *Scriptores Rei Rusticæ Veteres Latini* (4 vols., Leipzig, 1795); the most recent edition is by Schmitt (ib., 1898). It was translated into English by Owen (London, 1803).

PALLANZA, pȧ-län′tsȧ. A town in the Province of Novara, Italy, situated on a headland in Lake Maggiore, 45 miles northwest of Milan (Map: Switzerland, C 3). It is 659 feet above the sea, with mountains protecting it from the north, and is esteemed as a winter resort, owing to its mild climate. It has several old churches and a botanical garden. Pop. (commune), 1901, 5237; 1911, 5716.

PAL′LAS. A Greek goddess, identical with Athena. See Minerva.

PALLAS, păl′lȧs, Peter Simon (1741–1811). A German-Russian traveler and naturalist, born in Berlin. He studied medicine and natural history and was employed in classifying many valuable collections in both Holland and England. In 1764 he was elected a foreign member of the Royal Society. He gained a high reputation by the publication of his *Elenchus Zoophytorum* (1766), a work still much valued, and *Miscellanea Zoologica* (1766; 2d ed., 1778). In 1768 the Empress Catharine II invited him to St. Petersburg, where he was made a member of the Academy of Sciences, and he was subsequently appointed naturalist to a scientific expedition bound for Siberia, the immediate object of which was to observe the transit of Venus. Pallas spent six years on his journey (1768–74), exploring in succession the Ural Mountains, the Kirghiz Steppes, a great part of the Altaian Range, the country around Lake Baikal, and the steppes of the Volga, returning to St. Petersburg in 1774 with an extraordinary treasure of specimens in natural history, which form the nucleus of the museum of the Academy of St. Petersburg. His travels, *Reisen durch verschiedene Provinzen des russischen Reichs in den Jahren 1768–74*, were published at St. Petersburg (1771–76) and were followed by his *Sammlung historischer Nachrichten über die mongolischen Völkerschaften* (1776–1802) and his *Neue nordische Beiträge zur physikalischen und geographischen Erd- und Völkerbeschreibung, Naturgeschichte und Oekonomie* (1781–96). Without neglecting any branch of natural history he now devoted himself more particularly to botany; his magnificent *Flora Rossica* (1784–89) and his *Species Astragalorum* (1800–02) were among the results of his studies. He published also *Icones Insectorum Præcipue Rossiæ Sibiriæque Peculiarium* (1801) and contributed to a glossary of all the languages of the Russian Empire, which was published at St. Petersburg. As he wished to live in the Crimea, the Empress Catharine presented him with an estate in the finest part of that peninsula, where he resided after 1796. In 1810 he went to Berlin, where he died. His *Bemerkungen auf einer Reise durch die südlichen Statthalterschaften des russischen Reichs in den Jahren 1793–94* was published in 1799–1801.

PALLAVICINI, păl′lȧ-vē-chē′nē, Carlo (1630–1688). An Italian operatic composer, born at Salò. In 1667 he became assistant conductor at the Dresden Opera and in 1672 court conductor. After that he spent several years in Italy, but returned to Dresden in 1686 as director of the newly established Italian Opera. He wrote numerous operas, of which *Gerusalemme liberata* (1656) is of historical interest as containing the earliest example of the *da capo* aria. See Aria.

PALLAVICINO, păl′lȧ-vē-chē′nō, Sforza (1607–67). An Italian historian, son of the Marquis Alessandro Pallavicino of Parma. He was born at Rome, Nov. 28, 1607. He took orders and held several important ecclesiastical appointments during the pontificate of Urban VIII. In 1637 he became a member of the Society of Jesus and was created a Cardinal in 1659 by Pope Alexander VII. He died in Rome, June 5, 1667. In Latin he wrote theological and polemical works, the *Vindicationes Societatis Jesu* and the *Assertinum Theologicarum Libri*. Of his Italian works may be mentioned the fragmentary *Fasti sacri* in octaves; the tragedy *Ermenegildo* (1644); the *Avvertimenti grammaticali a chi scrive in italiano* (1661); the posthumously published *Della vita di Allessandro VII, libri cinque* (1839–40), one of his best works; and his correspondence (*Lettere*, recent ed., Rome, 1848). The most noted of all his writings is the *Istoria del Concilio di Trento* (Rome, 1656–57; 2d ed., 1664), in which he defends with able subtlety the spiritual and temporal supremacy of the papacy, questioned by Sarpi in his *Storia del concilio di Trento*. Theological prejudice, however, hampers his sureness of judgment and clouds his perception of historical fact, nor is he above striving overanxiously for elegance of style.

Consult the *Opere edite ed inedite di Sforza Pallavicino*, containing in vol. ii Affo's *Memorie della vita e degli studi del cardinale Sforza Pallavicino* (Rome, 1844–48).

PALLEN, păl′en, Condé Benoist (1858–). An American Catholic editor and author. He was born in St. Louis and graduated from Georgetown University in 1880 and from St. Louis University (Ph.D.) in 1885. From 1887 to 1897 he was editor of *Church Progress* and the *Catholic World*. He became widely known as a contributor to Catholic publications, served on the staff of the New International Encyclopædia, and was managing editor of the *Catholic Encyclopedia*. He is the author of *The Philosophy of Literature* (1897); *Epochs of Literature* (1898); *What Is Liberalism?* (1889); *New Rubáiyát* (1889), poems; *The Feast of Thalarchus: A Dramatic Poem* (1901); *The Death of Sir Launcelot, and Other Poems* (1902); *The Meaning of the Idylls of the King* (1904).

PALLIS, pȧl′lēs, Alexander (1851–). A modern Greek scholar, poet, and advocate of the popular speech for purposes of literature in opposition to the affected literary language of his time. Born in the Piræus, Greece, he came into prominence through the riots in Athens caused by the publication of his modern popular version of the Gospel of Matthew in the *Akropolis*, an Athenian newspaper. This publication led to bitter hostility, which ended in bloodshed and the prohibition by the Synod of all modern Greek versions of the New Testament in Greece. Pallis then published his translation of the four Gospels in Liverpool, England (1902), which he followed (1903) with *A Few Notes on the Gospels according to St. Mark and St. Matthew*. He was joint translator of Kant's *Kritik* (Athens, 1904). In the same year appeared in Paris his version of the whole *Iliad;* his version of Euripides' *Cyclops* was published in Liverpool, 1906. Later, he put together a considerable collection of his own poems (Athens, 1907). Pallis became a merchant in Liverpool. Consult K. Krumbacher, *Das Problem der neugriechischen Schriftsprache* (Munich, 1902).

PALLISER, păl'ĭ-sẽr, JOHN (1817–87). A Canadian geographer and explorer. He was born in the County of Waterford, Ireland. In early manhood he served in the Waterford militia, becoming captain, and in 1844 he was sheriff of Waterford County. He went to Canada in 1847 and traveled in the western and northwestern part of British America, hunting and exploring. Returning to England, he published *Adventures of a Hunter in the Prairies* (1853). By authority of the British government he explored in 1857–60 a large part of the British American Northwest, going as far as the Pacific coast. He also topographically determined the boundary line between the United States and British North America, from Lake Superior across the Rocky Mountains to the Pacific coast. He received the Victoria gold medal of the Royal Geographical Society in 1859, later was made a fellow thereof, and in 1877 received the decoration of C. M. G.

PAL'LIUM (Lat., mantle, cloak). The name given in the Roman Catholic church to an ecclesiastical vestment worn by the Pope, by patriarchs, and by archbishops. Its use is very ancient, and a respectable tradition carries it much farther back than the earliest positive historical notice of it, in the life of Pope Marcus (d. 336), a contemporary of Constantine the Great. By archbishops it cannot be worn until it has been solemnly asked for and granted by the Pope, and even then only at high mass on certain specified great festivals or on the occasion of important functions, such as the consecration of bishops or churches. The pallium is a narrow band of white woolen web, about two inches wide, embroidered with six black crosses, which encircles the neck of the archbishop, and from which two narrow bands of the same material depend—one falling over the breast, the other over the back of the wearer. It is made by nuns wholly or in part from the wool of two lambs, which are blessed annually on the festival and in the church of St. Agnes. During the night before the feast of St. Peter and St. Paul the pallia made of this wool are placed on the altar above the tomb of these Apostles. Within three months of his consecration every new archbishop is obliged to apply to the Pope, in person or by proxy, for the pallium; nor is it lawful for him, until he shall have received it, to exercise any act of what is properly archiepiscopal jurisdiction. Consult: Vespasiani, *De Sacri Pallii Origine* (Rome, 1856); Thurston, *The Pallium* (London, 1892); T. H. Passmore, *Sacred Vestments* (ib., 1899); Braun, *Die liturgische Gewandung im Occident und Orient* (Freiburg, 1907). See COSTUME, ECCLESIASTICAL.

PALL MALL, pĕl mĕl *or* păl'măl'. The name of a street of London, famous for its clubs and palaces. The name is derived from the old game of *pail mail*, introduced during the reign of Charles I. Originally a suburban promenade, Pall Mall became a street at the close of the seventeenth century. Many important historical and literary personages have lived along its borders. Among the prominent clubs are the Athenæum, Traveller's, Reform, Carlton, Army and Navy, Oxford and Cambridge, White's, Royal Automobile, and the Devonshire. The Crimean Monument, the York Column, and the statues of George III and Sir John Franklin are the principal works of sculpture on the thoroughfare, upon which Her Majesty's Theatre and the Haymarket Theatre also front. The London House, the Winchester House, the Marlborough House, St. James's Palace, and the Spencer House are the principal places of note.

PALM (AS. *palm*, from Lat. *palma*, palm tree, palm of the hand; connected with Gk. *παλάμη*, *palamē*, Skt. *pāni*, OIr. *lam*, OHG. *folma*, AS. *folm*, palm of the hand, and ultimately with OHG. *fuolen*, Ger. *fühlen*, AS. *fēlan*, Eng. *feel;* so called from the resemblance of the leaves to the outspread hand). The great tree group of about 150 genera and 1200 species of monocotyledons, displayed almost exclusively in the tropics, where they form a most striking part of the vegetation. The general habit of the palm, with its columnar trunk often buttressed at the base, sometimes rising more than 100 feet and crowned by a rosette of huge leaves, is well known. All palms, however, do not exhibit this habit. for some have branching stems (e.g., doom palm), some are but 3 or 4 feet high, and some have such long and slender stems that they are ropelike and climbing, by means of hooked spines, as in the rattan palms. Some species have flexible stems which often attain a height of 500 and even 600 feet. Indeed, Rumphius asserts that they are sometimes 1200 or even 1800 feet long.

The leaves of palms are of two general kinds—the palmate or fan forms, and the pinnate or fern forms, as the date palm (*Phœnix dactylifera*) and the coconut palm (*Cocos nucifera*). Examples of the former are the common fan palm (*Livistona sinensis*) and the palmetto (*Sabal palmetto*) of the Southern States. In the latter some species produce leaves 50 feet long and 8 feet broad; in the former 30 feet long and 4 to 5 feet broad, undivided. The flowers occur in enormous clusters, at first ensheathed by huge and frequently woody spathes which often burst with an explosion, and are usually more or less pendent from among the crown of leaves. Humboldt estimated the number of flowers on a single palm (a species of *Elæis*) to be about 600,000. The fruit is sometimes a kind of berry, sometimes a drupe, either with a fleshy or fibrous covering, and sometimes contains a very hard and bony nut. It is sometimes only of the size of a pea or a cherry; sometimes, as in coconut, notwithstanding the smallness of the flowers, it is of a very large size. See GOMUTI, and Plate of MONOCOTYLEDONS AND PALMETTOS.

A few species are found in temperate regions;

one species only, *Chamærops humilis*, being a native of Europe, and extending as far north as lat. 44°, while the northern limit of palms in Asia is about lat. 34° and in North America lat. 35°, in South America the southern limit of palms is lat. 36°, in Australia it is lat. 35°, in Africa no native species is found farther south than lat. 30°, but in New Zealand one species extends as far south as lat. 38°. Some of the species which are found in tropical America grow in mountain regions bordering upon the limits of perpetual snow. Some species are restricted to very narrow geographical limits. The coconut palm, which is by far the most extensively distributed, grows in maritime, others in inland, districts. Some grow on dry and sandy ground, others in the richest alluvial soil, and some in swampy situations; some in open districts, others in dense forests. Some species are generally found singly, some in groups; some even cover tracts of country in which no other tree appears.

There is almost no species of the palm which is not capable of being applied to some use, and in economic importance the family is excelled by no other family of plants except the grasses. For the vast variety of its products, see Arrack; Assai; Astrocaryum; Coconut; Date; Jaggery; Nipa; Oil Palm; Palmetto; Palm Oil; Palmyra Palm; Rattan; Sago.

The cultivation of palms in hothouses is generally attended with great expense. In hothouses they are cultivated merely as objects of interest and never for the sake of their fruit or any other product.

PALM, Inaja. See Inaja Palm.

PALM, Johann Philipp (1766–1806). A bookseller of Nuremberg, who has acquired historic celebrity as a victim of Napoleonic tyranny in Germany. He was born in Schorndorf, Bavaria, and succeeded his father-in-law, Stein, as a bookseller in Nuremberg, the old name of the firm being retained. In the spring of 1806 a pamphlet, entitled *Deutschland in seiner tiefen Erniedrigung*, which contained some bitter truths concerning Napoleon and the conduct of the French troops in Bavaria, was sent by this firm to a bookseller in Augsburg in the ordinary course of trade, and, as Palm to the last moment of his life averred, without any regard, on his part, to its contents. Napoleon's police traced it to the shop in Nuremberg, and an investigation was ordered. Palm was in Munich, but he returned to Nuremberg and was there arrested. An extraordinary court-martial, held at Braunau, to which place he was removed, condemned him to death (Aug. 25, 1806), no advocate being heard in his defense. General Saint-Hilaire declared that the orders of the Emperor were positive, and the sentence was executed at two o'clock on the same day on which it was pronounced. The execution of Palm served to stir up a feeling of bitter hatred among the German people against the domination of the French and aroused the general indignation of Europe. With the murder of the Duc d'Enghien (q.v.) this was one of Napoleon's gravest blunders. Consult J. Rackl, *Der Nürnberger Buchhändler Johann Philipp Palm* (Nuremberg, 1906).

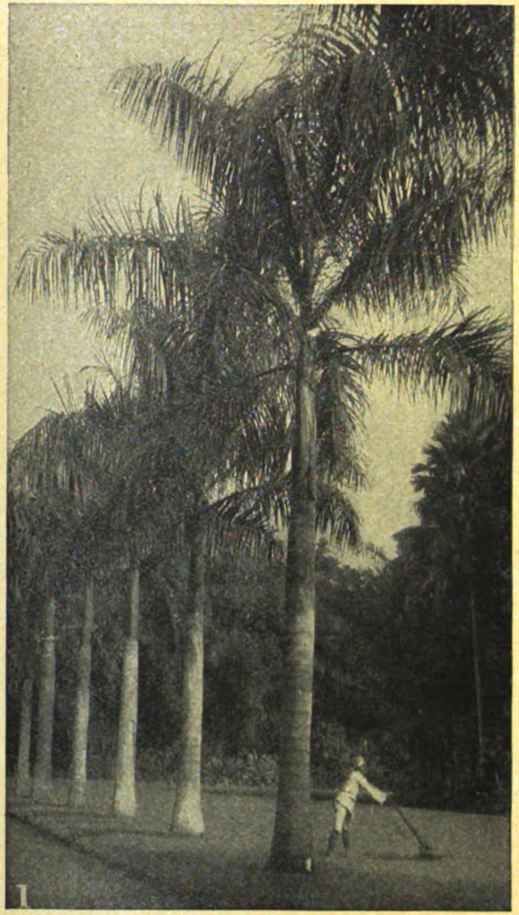
PALMA, päl′mȧ. One of the Canary Islands (q.v.).

PALMA. The capital of the island of Majorca (q.v.) and of the Spanish Province of Baleares (Map: Spain, G 3). It is situated on the southwest coast of the island, on the Gulf of Palma, which, between Capes Cala Figuera and Blanco, is 18 miles long and sweeps 12 miles inland. The city is surrounded by orange plantations and is walled and fortified. The houses, some of which are built of marble, are mostly in the Moorish style of architecture. Palma is the see of a bishop and has a Gothic cathedral which is simple but beautiful in style, with a spire so delicate and airy that it is called the Angel's Tower. There are several other interesting buildings, such as the church of San Francisco (with the tomb of Raymond Lully), the Bank of Spain, the Exchange (a beautiful and ornate structure in Germano-Gothic), and the Governor's Palace. The chief educational institutions are a seminary, a normal school, a school of fine arts, and a museum of paintings. The chief manufactures are alcohol, liquors, chocolate, starch, sugar, flour, soap, leather, and glass. In the port a mole 500 yards in length runs out from the bastions facing the south, and on each side of it are shipbuilding yards. The harbor is well sheltered and is much used as a port of call; steamers leave it regularly several times a week for Barcelona, Valencia, and Alicante. The chief exports are oil, wine, and fruit. Pop., 1887, 60,514; 1900, 63,937; 1910, 67,544.

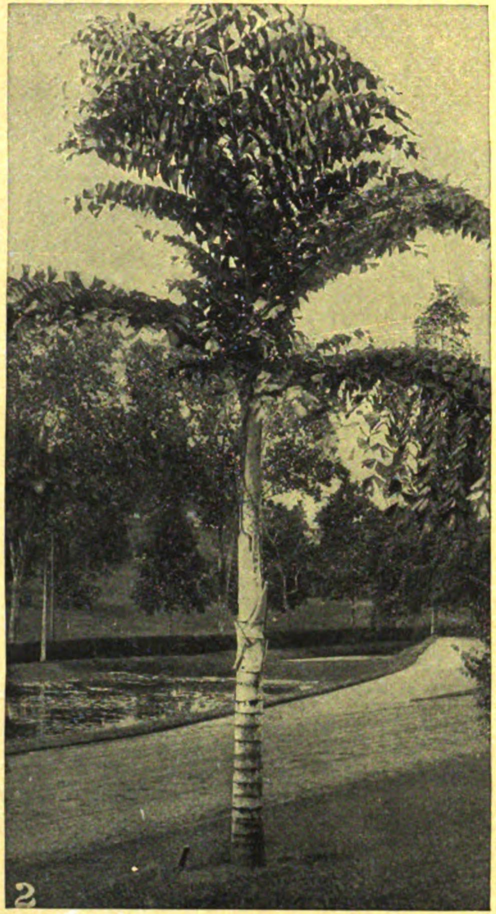
PALMA, Jacopo, called Palma Vecchio (the Elder) (c.1480–1528). A Venetian painter of the high Renaissance. He was born at Serinalta, near Bergamo, about 1480, and studied principally under Giovanni Bellini at Venice. His earliest style first reflects Bergamasque influence; later his works, particularly the oblong Sacre Conversazione and "Holy Families," though freer and heavier, show a debt to Bellini. His second manner, evidencing the influence of Giorgione, is characterized by rich coloring and brilliant lighting, combined with masterly breadth of treatment. Like his great contemporaries, he achieved idealism through the perfection of nature. The finest example of this period is the altarpiece of St. Barbara in the church of Santa Maria Formosa, Venice. The figure of the saint is one of the most beautiful and majestic female forms in Venetian art. His later works, painted in a lower key and executed with less care, constitute his third (*blonde*) manner. The "Three Sisters," Dresden, is typical of this class. Palma was a prolific painter, and at the time of his death, which occurred at Venice, Aug. 18, 1528, no fewer than 40 unfinished works remained. Among his works the following may be selected as characteristic: "Adam and Eve," Brunswick, for the early period; "St. Peter Enthroned" and "Christ and the Adulteress," in the Academy, Venice. To the best period are assigned "The Adoration of the Shepherds," in the Louvre; "Portrait of a Poet," National Gallery, London; "Meeting of Jacob and Rachel," Dresden Gallery; "St. Peter Presenting a Worshiper to the Infant Christ," Colonna Palace, Rome; "The Madonna and Child Adored by Saints"; and a number of female portraits in the Vienna Museum. Consult: Morelli, *Italian Masters in German Galleries* (London, 1883); Locatelli, *Notizie intorno a Giacomo Palma* (Bergamo, 1890); Max von Boehm, *Giorgione und Palma Vecchio* (Bielefeld, 1908); Aldo Foratti, *Note su Jacopo Palma il Vecchio* (Padua, 1912); Crowe and Cavalcaselle, *History of Painting in North Italy* (London, 1912).

PALMA, Jacopo, called Il Giovane (the

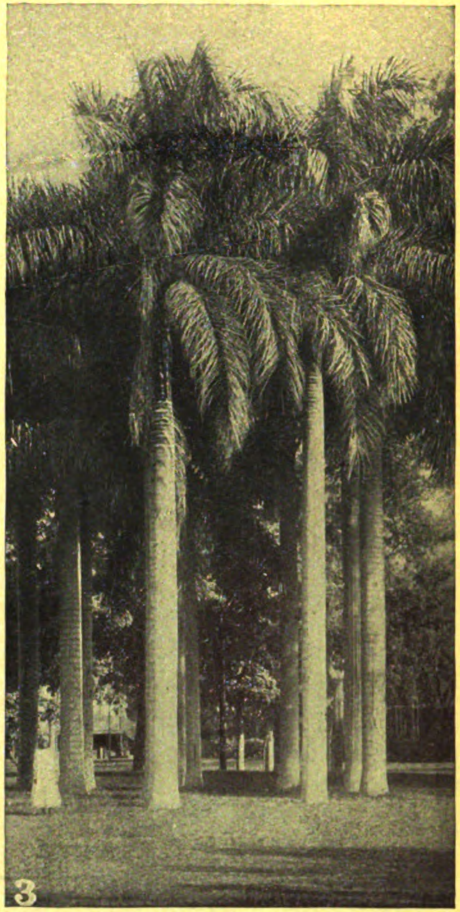
PALMS



1. ROYAL PALM



2. WINE PALM



3. SAGO PALM

Younger) (c.1544–1628). A Venetian painter, grandnephew of Jacopo Palma the Elder. He was born in Venice, where he passed most of his life. A pupil of Antonio Palma, a second-class Venetian painter, he received his real inspiration from the study of the works of Titian and Tintoretto, the later, during an eight years' stay in Rome, came under the influence of the great masters of the Roman Renaissance. He acquired a mastery of expression and a facility in handling beyond that possessed by the majority of his contemporaries. The great deficiency in his work is the mechanical or manneristic method, which makes itself felt in spite of the excellences of color or line. A number of his best productions, which are historical and religious in character, are in the Ducal Palace, the Academy, and the churches of Venice, a typical example being "St. Catharine Rescued from the Wheel," in the church of the Frari. Other examples are in the galleries of Vienna, Madrid, Munich, Dresden, etc.

PALMA, RICARDO (1833–). A Peruvian poet and prose writer, born at Lima. He was educated at the University of San Marcos del Rimac, and as associate editor of the Lima periodical *El Diablo* (1860) he was banished for a time for his political opinions. He held a position in the Peruvian National Library and after it was destroyed by the Chileans, in 1881, undertook its restoration with foreign help. He published in Lima *Los anales de la inquisición de Lima* (1863) and *Poesías* (1887), which contains all of his poetic work. His *Tradiciones,* a type of literature which he created and which seems destined to outlive all his other writings, contain many interesting historical and other legends of Peru. In 1886 he brought on a social and religious revolution against the Jesuits, with the result that the society was perpetually expelled from Peru. Consult: *Tradiciones peruanas* (4 vols., Barcelona, 1893–96) and the supplementary volume *Tradiciones y artículos históricos* (Lima, 1899); also Ventura García Calderón, *Del Romanticismo al Modernismo: Prosistas y Poetas peruanos* (Paris, 1910).

PALMA, TOMÁS ESTRADA (1835–1908). A Cuban patriot and President, born near Bayamo, where his father owned large estates. He studied law at the University of Seville in Spain. Upon the outbreak of the 10 years' war (1868–78) he joined the revolutionists, soon rose to the rank of general, and towards the end of the war was elected to the presidency of the Cuban Republic. Soon afterward (1877) he was captured by the Spaniards and sent to Spain, where he was kept in confinement until the end of the insurrection. Then, as his parents were dead and his estates confiscated, he went to Honduras, where he married the daughter of the President and became Postmaster-General. A few years later he removed to the United States and opened a school for Latin-American boys at Central Valley, Orange Co., N. Y. This he maintained until 1895, when the Cubans again rebelled; whereupon he closed his school and became active in the Cuban Junta in New York. Upon the death of Martí (q.v.), Estrada Palma became the head of the *Club Revolucionario Cubano,* which furnished effective aid to the revolutionary army in Cuba and played an important part in securing the independence of the island. The efficient services of Estrada Palma were remembered by his countrymen when in 1901 they were called upon to choose their first President, for after Máximo Gómez (q.v.) refused to be a candidate he became their almost unanimous choice. The country prospered greatly under his administration. He joined the Conservative party, and because of his mild character fell under the domination of politicians, who practiced corrupt methods to secure his reëlection in 1906. This led to a revolt of the Liberals, and on Sept. 6, 1906, he resigned. On account of a deadlock in Congress no successor was chosen, and the United States took control of the government. See CUBA.

PALMA CHRISTI, păl′mȧ krĭs′tĭ. See CASTOR-OIL PLANT.

PALMA DI MONTECHIARO, dē mŏn′tȧ-kyä′rō. A town in the Province of Girgenti, Sicily, near the south coast, 13 miles east-southeast of Girgenti (Map: Italy, D 6). It is comparatively modern, dating from 1637. Through its harbor it has trade in wine, almonds, dried fruits, and sulphur. Pop. (commune), 1901, 14,330; 1911, 14,212.

PALMÆR, pȧl-mâr′, (KNUT) VILHELM (1868–). A Swedish chemist, born at Forsvik, District of Skaraborg. He studied at Upsala and Göttingen, gained the doctorate at Upsala in 1895, and after holding several other positions became professor in the Technical College at Stockholm (1907). For study he traveled in Germany, France, England, Switzerland, and also in America. Among his works are: *Ueber der Mirkungsart der Tropfelektroden* (1898); *Chemische Nachweisung der Konzentrationsänderungen bei Tropfelektroden* (1899); *A Brief Account of Dr. V. Palmær's Electrolytic Process for Producing Bicalcic Phosphate* (1904), besides many articles in periodicals. In 1900 he became secretary of the Nobel committees of the Academy of Sciences.

PALMAROLI, păl′mȧ-rō′lē, PIETRO (c.1750–1828). An Italian painter, chiefly distinguished as a restorer of paintings. He invented the art of transferring frescoes from the wall to canvas. The first work which he transferred in this manner was the "Descent from the Cross," by Daniele da Volterra, in the church of Trinità de' Monti in Rome in 1809. He afterward restored many paintings in Dresden, including the Sistine Madonna, and a number of famous paintings at Rome, among them Raphael's "Sibyls" in Santa Maria della Pace.

PAL′MAS, CAPE. See CAPE PALMAS.

PALM BEACH. A resort in Palm Beach Co., Fla., 299 miles by rail southeast of Jacksonville, on the Florida East Coast Railroad, on the East Coast Canal, and on Lake Worth, an arm of the Atlantic Ocean (Map: Florida, F 5). On account of its fine location, its splendid bathing and boating facilities, and its equable climate (average in winter about 72° F.), Palm Beach has become the most popular winter resort in Florida. Here is situated the Royal Poinciana, one of the largest hotels in the country, and there are also a number of other hostelries and beautiful parks. Across the lake, on the mainland, is the incorporated city of West Palm Beach, the county seat, and also a place of resort. There are some farming and fishing interests in the vicinity. A railroad is now (1915) being built from this place to the south end of Lake Okeechobee, which will render the Upper Everglades accessible, thus opening for settlement 500,000 acres of unusually fertile land. Pop. (Palm Beach local est.), permanent, 1000; winter, 5000. West Palm Beach Precinct, including West Palm Beach City, 1910, 2541.

PALMBLAD, pälm′bläd, Vilhelm Fredrik (1788–1852). A Swedish author, professor of history, geography, and Greek at Upsala, and editor of the great *Swedish Biographical Dictionary* (23 vols., 1835–52). While a student at Upsala (1806–10) he purchased the university printing press and used it for the popularization of learning. He published the literary journal *Phosphorus*, an annual *Poetic Calendar*, and a literary review. In these enterprises Atterbom and Hammarsköld were associated with Palmblad in efforts to supplant the classical by romantic literary ideals. Palmblad was an industrious writer. His *Manual of Physical and Political Geography* (5 vols., 1826–37) is the best in Swedish. His contributions to history are superseded, as are his translations of Greek dramatists and his *Greek Etymology* (1845). Of his novels, the best are *Familjen Falkensvärd* (1844) and *Aurora Königsmark* (1846). Of his short stories, *Amala* (1817) and *Holmen i sjön Dall* (1819) are good.

PALM CABBAGE. See Date.

PALM CIVET. A civet (q.v.) of the genus *Paradoxurus;* a paradoxure, tree cat, or toddy cat. This group differs from the true civets in important points of skull structure, dentition, and coloration (the tail not being distinctly ringed), and in having mainly arboreal habits. All are Oriental, and 10 or 12 species are scattered over India, the Malay Peninsula and Archipelago, and southern China. They have the slender, sharp-nosed civet form, are about the size of house cats, and their relatively long fur is often beautifully striped and spotted. The animals spend most of their time in trees, especially palms, but often live in the thatched roofs of cottages. During the day they sleep, coiled into a ball, and they become active only in the night, when they display remarkable agility in climbing. Their food is mainly vegetable, but all eat more or less of insects, birds' eggs and fledglings, and other small creatures. Like the fox bats, they are very fond of the palm juice or "toddy" collected by the natives in vessels attached to the cut spathes of various Indian palms, especially the jaggery (*Caryota urens*). They are sometimes domesticated. Consult: T. C. Jerdon, *Mammals of British India* (London, 1868); A. R. Wallace, *Tropical Nature* (ib., 1878); W. T. Blanford, *Fauna of British India: Mammals* (ib., 1888); Richard Lyddeker, "Cats, Civets, and Mungooses," in *Allen's Natural History* (ib., 1894).

PALM CRAB. See Coconut Crab.

PALMEIRIM DE INGLATERRA, păl′mȧ-ê-rēm′ dȧ ĕṉ′glȧ-tĕr′rȧ (Sp., Palmer of England). The fourth and best of the series of romances of chivalry known as the *Palmerines*. A new edition of the text was prepared by Adolfo Bonilla y San Martín, *Libros de Caballerías: Segunda Parte* (*Nueva Biblioteca de Autores Españoles*, vol. xi, Madrid, 1908). See Moraes, Francisco de.

PALMÉN, pȧl-mān′, Ernst Gustaf (1849–). A Finnish historian, born at Helsingfors and educated at the University of Helsingfors (Ph.D., 1877), where he was a member of the faculty until 1911. He wrote historical, literary, and political essays; edited the political works of Anders Chydenius (1877–80); edited, with others, *Oma Maa* (Our Own Land, 6 vols., 1907–12); and was editor of the periodical *Valvoja*. For years he sat in Parliament, where he worked energetically for the welfare of Finland.

PALMER, päm′ẽr. A town, including several villages, in Hampden Co., Mass., 15 miles east by north of Springfield, on the Chicopee River, and on the Central Vermont and the Boston and Albany railroads (Map: Massachusetts, C 4). It has a public library and the Young Men's Library Association, is the seat of the Massachusetts Hospital for Epileptics, and is prominent as an industrial centre, its manufactures including cotton goods, foundry and machine-shop products, carpets, wire, etc. The government is administered by town meetings. Pop., 1900, 7801; 1910, 8610; 1914 (U. S. est.), 8955.

Settled in 1716, Palmer became a district in 1752 and a town in 1775. Before incorporation it was known variously as New Marlborough, Kinsfield, the Elbow Tract, and in 1741–52 as Kingston, in honor of the first settler, John King. Consult Temple, *History of the Town of Palmer, Massachusetts* (Palmer, 1889).

PALMER. See Pilgrim.

PALMER, Albert Marshman (1838–1905). An American theatrical manager, born at North Stonington, Conn. He graduated from the law school of the University of New York in 1860, served as librarian of the Mercantile Library, New York, in 1869–72, and then for 10 years managed the Union Square Theatre. After traveling in Europe he returned to New York in 1884 and then took charge of the Madison Square Theatre and later also of Palmer's Theatre at Broadway and Thirtieth Street. Richard Mansfield for a time appeared under his management, as well as Clara Morris and many other notable stage people who played in his famous stock companies. His traveling companies made the plays *Jim the Penman*, *Saints and Sinners*, *A Pair of Spectacles*, and *Elaine* known throughout the country. Among the playwrights whom he encouraged were Bronson Howard, G. F. Rowe, Steele Mackaye, W. D. Howells, and Brander Matthews. For 14 years Palmer was president of the Actors' Fund of America, which he originated in 1882.

PALMER, Alice Freeman (1855–1902). An American educator. She was born at Colesville, N. Y., was brought up at Windsor, N. Y., graduated at the University of Michigan in 1876, and taught at Lake Geneva, Wis. (1876–77), and at Saginaw, Mich. (1877–79). Elected to the chair of history in Wellesley College in 1879, she became acting president the next year and in 1882 president. Under her direction the college grew and its organization was perfected. After her marriage to George Herbert Palmer (q.v.) in 1887, she became prominent in the Woman's Educational Association of Boston. In 1892 she became nonresident dean of the women's department in the University of Chicago. She died suddenly in Paris. Wellesley College possesses a very beautiful memorial to Alice Freeman Palmer, sculptured in relief by Daniel Chester French. Consult *The Life of Alice Freeman Palmer* by her husband (Boston and New York, 1908).

PALMER, Anthony (c.1675–1749). An American Colonial Governor, born probably in England. After engaging in mercantile pursuits in Barbados for some years, he emigrated to Pennsylvania in 1707 and settled in Philadelphia. From 1708 until his death he was a member of the Provincial Council of Pennsylvania, ultimately becoming its President, in which capacity, after the resignation of Lieutenant Governor Thomas in 1747, he acted as Governor for a year and a half, taking measures for the protection of the Colony against Spain and France, then at war with Great Britain, and making several important Indian treaties. He owned what is now the Kensington District of Philadelphia.

PALMER, Arthur (1841-97). A British Latin scholar, born in Guelph, Ontario, Canada. He was reared in Canada, made a notable record as a student at Trinity College, Dublin, and became fellow there in 1867 and professor of Latin in 1880. His field was Latin poetry, especially of the Augustan age, and he was famed for his brilliant Latin style and for his felicitous emendations of Plautus, the Augustan poets (save Vergil), and Aristophanes. In the first editions of Herondas (1891) and of Bacchylides (1897) he was active. He edited: Ovid's *Heroides*, with Planudes' version (1874; revised, 1898), probably his greatest work; *Propertius* (1880); Horace, *Satires* (1883; 5th ed., 1893). Consult R. Y. Tyrrell, *Hermathena*, vol. x (Dublin, 1899).

PALMER, Arthur Hubbell (1859-). An American Germanic scholar, born in Cleveland, Ohio. He graduated at Western Reserve University in 1879. After two years' study in Europe he became professor of German at Adelbert College, Cleveland, and from 1886 to 1891 was librarian of the college as well. In 1891 he was called to Yale University as professor of German language and literature. He edited various German texts, among them Schiller's *Wilhelm Tell* (1898; new rev. ed., 1915) and *Geschichte des dreissigjährigen Krieges* (1899) and Goethe's *Hermann und Dorothea* (1903). He also translated into English Björnstjerne Björnson's poems and songs (1915). Palmer became a trustee of the American-Scandinavian Foundation, New York.

PALMER, Edward Henry (1840-82). An English Oriental scholar. He was born in Cambridge and went into business in London. In 1863 he entered St. John's College, Cambridge, where he graduated in 1867, and was in that year appointed fellow. In 1869 he went to Sinai on the Sinai survey expedition; and in 1870 he again made explorations in the desert of Tih, Edom, and Moab with C. F. T. Drake. In 1871 he became professor of Arabic at Cambridge. In 1881 he resigned this position and went to London, where he engaged in journalism. In 1882 he was sent on a secret-service mission among the Bedouin tribes to induce them not to ally themselves with Arabi Pasha (q.v.) in his rebellion against the Khedive. He met with eminent success, but while on the mission was betrayed by a guide and murdered by Abu Sufya. A punitive expedition was sent out under the leadership of Kitchener. The identity of the murderer was not established, but the tribes were severely punished. Schmidt found Abu Sufya's guilt a matter of common knowledge among the tribes of the district and possesses the phonographic record of a taunt song on Selim Abu'l Antar, his son, in which Abu Sufya's crime is mentioned. His remains, recovered by Warren, rest in St. Paul's Cathedral. Palmer was a prolific writer on Oriental topics. Among his works are the following: *Oriental Mysticism, Theosophy of the Persians* (1867); *The Desert of the Exodus* (2 vols., 1871); *History of Jerusalem* (1871), with Besant; *Arabic Grammar* (1877); *A Concise Dictionary of the Persian Language* (1876; 2d ed., 1884); *English-Persian Dictionary*, completed after his death by G. Le Strange (1883); a translation of the Koran, in the *Sacred Books of the East* (1880); several translations from and into Persian; *The Poetical Works of Beha-ed-din Zoheir of Egypt, with a Metrical English Translation, Notes, and Introduction* (1876-77; the notes were never published); and a *Simplified Grammar of Hindustani, Persian, and Arabic* (1882; 2d ed., 1885). Consult his *Life* by Walter Besant (London, 1883), and for his death Schmidt, "Kadesh Barnea," in *Journal of Biblical Literature* (Boston, 1910).

PALMER, Erastus Dow (1817-1904). One of the foremost early American sculptors. He was born at Pompey, Onondaga Co., N. Y., April 2, 1817. At first a carpenter by trade, he began his artistic career in Albany as a cameo cutter, then attempted sculpture, and in 1850 exhibited his first marble bust, the "Infant Ceres," at the Academy of Design, New York. This was followed by ideal heads and bas-reliefs, good examples of which are "Faith" and "Mercy," and in 1856 by his first full-length statue, "The Indian Girl" (Metropolitan Museum, New York). In 1858 "The White Captive" (ib.), a remarkable piece of work for its day, aroused great and deserved enthusiasm. Entirely self-taught and free from the customary classical training at Rome, Palmer was more purely national than any other sculptor of his day, and as such exercised a potent influence upon its development. His technique, devoid of classic conventionalities, displays delicacy of modeling combined with sureness and breadth of treatment. His ideal figures possess poetic and dramatic qualities unparalleled for their time and are impressively conceived. Characteristic and often decidedly individual in treatment also are his numerous portrait busts of important contemporaries. Among his noted achievements are "The Angel at the Sepulchre" (Rural Cemetery, Albany), the relief "Peace in Bondage," and the statue of Robert Livingston (Capitol, Washington), which was awarded a gold medal at Philadelphia in 1876. His portrait busts include those of Alexander Hamilton, Washington Irving (New York Historical Society), Henry Burden and Dr. Armsby (Washington Park, Albany, N. Y.). Most of Palmer's life was spent in Albany. Consult Lorado Taft, *History of American Sculpture* (New York, 1903).

PALMER, George Herbert (1842-). An American scholar and writer, born in Boston. In 1864 he graduated at Harvard, to which he returned (1870), after study at Tübingen, Germany, and at Andover Theological Seminary, to be tutor in Greek. Later, at Harvard, he was promoted to be curator of the Gray collection of engravings (1872-76), assistant professor of philosophy (1873-83), professor (1883-89), and Alford professor of natural religion, moral philosophy, and civil polity (1889-1913). In 1887 he married, as his second wife, Alice Freeman. (See Palmer, Alice Freeman.) Professor Palmer received honorary degrees from the University of Michigan and from Union, Harvard, Dartmouth, and Western Reserve. His publications include: *The New Edu-*

cation (1887); *The Glory of the Imperfect* (1898); *Self-Cultivation in English* (1897); *The Field of Ethics* (1901); *The Nature of Goodness* (1904); *The Life and Works of George Herbert* (3 vols., 1905); *The Teacher* (1908); *The Life of Alice Freeman Palmer* (1908); *Intimations of Immortality in the Sonnets of Shakespeare* (1912); *Trades and Professions* (1914); a prose translation (1884) of Homer's *Odyssey*, notable for the beauty of its diction and for its faithfulness to the original; and a translation (1899) of the *Antigone* of Sophocles.

PALMER, Herbert James (1851–). A Canadian statesman. He was born at Charlottetown, Prince Edward Island, and was educated at the Prince of Wales College in that city and at King's College, Windsor, Nova Scotia. He was called to the bar in 1877 and in 1900 was elected a Liberal member of the Provincial Legislature. In 1908 he was Attorney-General of the Province and in May–December, 1911, was Premier. In 1910 he was sent to St. John, New Brunswick, as a delegate to the Conference on Representation of the Maritime Provinces in the Dominion Parliament.

PALMER, James Croxal (1811–87). An American surgeon. Born in Baltimore, he graduated M.D. from the University of Maryland in 1833. The next year he joined the United States navy as surgeon, being gradually advanced until he became, in 1872, surgeon-general of the navy. In 1873 he retired. Palmer served in the Mexican and Civil wars.

PALMER, James Shedden (1810–67). An American naval officer, born in New Jersey. He entered the United States navy as midshipman in 1825, was made lieutenant in 1836, and during the Mexican War commanded the blockade schooner *Flirt*. In 1855 he was promoted to be commander, and at the outbreak of the Civil War he was in command of the *Iroquois* of the Mediterranean squadron. He was soon recalled and attached to Admiral Dupont's blockading fleet, was made captain in 1862, led the advance in the passage of the Vicksburg batteries, and participated in the fight with the Confederate ram *Arkansas*. In 1863 he was promoted to be commodore. He became a close friend of Farragut, whose flag captain he was at Mobile Bay and New Orleans. In 1866 he was made rear admiral and commanded the South Atlantic squadron until his death.

PALMER, John (c.1742–98). An English actor, born in London. He made his first appearance on the stage in 1762, but gained no great success until 1768. In 1772 he played at Liverpool and four years afterward reappeared at the Haymarket, where in 1777 he was the first Joseph Surface in *The School for Scandal*. Palmer built the Royalty in 1785, but never made it a success. The pamphleteering war in which he then engaged broke his spirit and health, and he died on the stage in the fourth act of *The Stranger*, in which he was playing at Liverpool.

PALMER, John McAuley (1817–1900). An American soldier and political leader, born at Eagle Creek, Scott Co., Ky. In 1831 he removed to Illinois and in 1839 was admitted to the bar. He took an active interest in politics and was elected by the Democrats to the State Senate in 1852, but soon afterward became identified with the new Republican party, was chosen a delegate to its first national convention, and in 1856 zealously supported Frémont's candidacy. On the outbreak of the Civil War he was commissioned colonel of the Fourteenth Illinois Volunteers, and on Dec. 20, 1861, was promoted to be brigadier general. He served with Frémont in Missouri and with Pope at New Madrid (March 13, 1862) and Island No. 10 (April 8, 1862). The same year he was advanced to the rank of major general and received command of a division, which he led at Murfreesboro (Dec. 31, 1862, to Jan. 2, 1863). At the battle of Chickamauga (Sept. 19–20, 1863) he led one of Crittenden's divisions, and at Chattanooga commanded the Fourteenth Corps of the Army of the Cumberland. His corps formed part of Thomas's command during the Atlanta campaign and took part in the desperate charge at Kenesaw Mountain (June 27, 1864) and in the battle at Peach Tree Creek (July 20, 1864), soon after which Palmer gave up his command. In 1868 he was elected Governor of Illinois by the Republicans, but four years later returned to the Democratic party and in 1876 energetically supported Samuel J. Tilden. In 1890 he was elected United States Senator and in 1896 accepted the nomination for President from the Gold Democrats. He wrote *Personal Recollections* (1901).

PALMER, John Williamson (1825–1906). An American poet, born in Baltimore, Md. He studied medicine, was first city physician of San Francisco (1849–50), went to China in 1851, volunteered in the East India Company's service, and was surgeon on a war steamer in the Burmese campaigns (1851–52). He also served as war correspondent for the New York *Tribune*. In 1853 he returned to the United States and wrote for various publications, also *The New and the Old, or California and India in Romantic Aspects* (1859), *Up and Down the Irrawaddi* (1860), and many poems, from which a selection was made in 1901. He is best known for his stirring ballad *Stonewall Jackson's Way*, written Sept. 17, 1862, while the battle of Antietam was in progress. Palmer was connected editorially with the *Century* and *Standard* dictionaries. Some translations also came from his pen: Michelet's *L'Amour* and *La femme* (1859) and Legouvé's *Histoire morale des femmes* (1860).

PALMER, Nathaniel Brown (1799–1877). An American sea captain, the discoverer of Palmer Land, the first part discovered of the continent of Antarctica. He was born at Stonington, Conn., and went to sea at the age of 14. In 1821, in command of the sloop *Hero*, of only 44 tons, he set out from Yankee Harbor in the South Shetlands to investigate a new land that had been sighted to the southward. On his return from this land he met the Russian exploring expedition under Bellingshausen. Palmer's name was unwarrantably displaced by the English admiralty from the land he discovered, being renamed Graham Land. Palmer was subsequently in command of various clipper ships and was a designer of clippers, among them the *Hoqua* and the *Oriental*. In 1849 he retired from the sea. As a director of the Fall River line of steamers, he was mainly instrumental in building the *Bristol* and the *Providence*. Consult E. S. Balch, *Antarctica* (Philadelphia, 1902), and A. W. Greely, *American Discoverers of the Antarctic Continent* (Washington, 1912).

PALMER, Ray (1808–87). An American clergyman and hymn writer. He was born at Little Compton, R. I., studied at Phillips Academy, Andover, Mass., and graduated from Yale College in 1830. Afterward he taught in New York City and in New Haven, Conn., and was pastor of Congregational churches at Bath, Me. (1835–50), and then at Albany, N. Y., until 1866, when he became secretary of the American Congregational Union (New York). The years previous to his death were spent at Newark, N. J. He is chiefly remembered as a writer of hymns, one of which, "My faith looks up to Thee," has been published in 20 languages. His collections of hymns include: *Hymns and Sacred Pieces* (1865); *Hymns of my Holy Hours* (1868); *Voices of Hope and Gladness* (1880).

PALMER, Roundell, first Earl of Selborne (1812–95). An English statesman, born at Mixbury in Oxford County, Nov. 27, 1812. He studied at Rugby and Winchester, graduated in 1834 from Oxford after a brilliant career there, and received his master's degree in 1836. In the following year he was admitted to the bar and soon became noted for his keen and subtle mind and his vast learning. In 1847 he entered Parliament for Plymouth and joined the adherents of Peel. After a varied parliamentary career, losing his seat on two occasions, he became Solicitor-General in Palmerston's cabinet in 1861, and in 1863 Attorney-General, which post he held until 1866. Palmer gave an independent support to Gladstone and in 1872 became Lord Chancellor and was raised to the peerage as Baron Selborne of Selborne. As Chancellor, Selborne had much to do with the reformation of the judiciary, he being the principal author of the Judicature Act of 1873. In 1874 he was displaced, but again became Chancellor in 1880 and in 1882 was created Viscount Wolmer of Blackmoor and Earl of Selborne. He was strongly opposed to the disestablishment of the Church of England and to home rule for Ireland and became a Liberal-Unionist. Consult *Selborne Memorials* (London, 1896–98).

PALMER, Samuel (1805–81). An English landscape painter, illustrator, and etcher. He was born at Newington, Jan. 27, 1805. He was largely self-taught, and his style was formed under the influence and advice of his father-in-law, John Linnell, and of William Blake. After 1837 he devoted himself mainly to water colors, becoming a full member of the Water Color Society in 1854. Palmer was the last of the ideal school of landscape painters in England. His aquarelles are good in color and characterized by wealth of poetic feeling. Among the best are: "The Eastern Gate" (1881) and "The Bellman" (first exhibited 1882); two of a fine series for Milton's *L'Allegro* and *Il Penseroso;* "Going Home" (South Kensington Museum); and "The Winding Stream" (ib.). His etchings, highly finished and marked by a subtle treatment of light, include "The Sleeping Shepherd," "The Skylark," and "The Lonely Tower" (1880). Consult A. H. Palmer, *Life and Letters of Samuel Palmer* (London, 1892).

PALMER, Thomas Witherell (1830–1913). An American legislator and business man, born in Detroit, Mich. He studied at the University of Michigan, then made a tour of Spain on foot, and traveled in South America. On his return he learned the lake-shipping business at Green Bay, Wis. From 1853 to 1872 he was member of a real-estate firm. A Republican, Palmer was elected to the first board of estimate of Detroit (1873) and in 1878 was elected to the State Senate, where he was author of a bill providing for a girls' reformatory school. In the meanwhile he had acquired large milling interests and had become director of several banks. In 1880 he was defeated for the nomination for Governor, but in 1883 was elected to the United States Senate. Palmer was president of the waterways convention at Sault Ste. Marie in 1887. In 1889–90 he served as Minister to Spain under appointment of President Harrison, and in 1892 he became president of the World's Columbian Commission.

PALMER, Walter Launt (1854–). An American landscape painter, son of the sculptor Erastus Palmer. He was born at Albany, N. Y., and was a pupil of F. S. Church and of Carolus Duran in Paris. He painted all forms of landscape, including charming views of Venice, but made a specialty of minutely elaborated winter scenes, and in his rendering of the clearness and brilliancy of New England winter atmosphere is perhaps unequaled. His chief works include: "Venice" (1882); "Domes of La Salute"; "Oaks in Winter" (1906); "The Glade" (1913); "The Sleeping Brook" (1914); "The Frozen Lake" (1915); "Sundown at Walpole, N. H." (Buffalo Academy). He received the second Hallgarten prize at New York in 1887, and a gold medal at the World's Columbian Exhibition in 1893. He was elected to membership in the National Academy, the Society of American Artists, and the American Water-Color Society.

PALMER, William Waldegrave. See Selborne, Earl of.

PALMERÍN DE OLIVA, päl'mȧ-rēn' dȧ ō-lē'vȧ (Sp., Palmer of the Olive Tree). The earliest known edition (Salamanca, 1511) gives the title twice as *Palmerín de Olivia.* The first of a series of chivalrous romances written in the Spanish Peninsula and of importance in the development of the modern novel. The *Palmerín de Oliva* is attributed to Francisco Vázquez, and also to a woman who perhaps was his mother.

PALMER LAND. The most northerly part of the continent of Antarctica, discovered (1820) by N. B. Palmer (q.v.). It was charted under that name on British and on French charts until Biscoe's discovery of Biscoe Islands (1832), when Palmer's name was unwarrantably displaced by that of Graham. Consult E. S. Balch, *Antarctica* (Philadelphia, 1902). See Polar Research.

PALMERSTON, päm'ẽr-ston, Henry John Temple, third Viscount (1784–1865). An English statesman. He was born in Hampshire, Oct. 20, 1784, a descendant of an old and historic family. Receiving his early education at home under an Italian refugee and at Harrow, Palmerston studied later in the University of Edinburgh, under Dugald Stewart, in whose family he lived, and at St. John's College, Cambridge, where he received his master's degree in 1806. He succeeded his father in the Irish peerage in 1802. His eminent abilities were early recognized; the Tory party in the university selected him in 1806 as their candidate to succeed Pitt. Twice unsuccessful, he entered Parliament for Newtown, a pocket borough, which seat he held till 1811, when he was chosen at Cambridge and represented his alma mater for 20 years, losing his seat only when he entered the Grey ministry and supported the Reform Bill. After a term for Bletchingley and one for South Hampshire, he found a seat at Tiverton in 1835, which he held till his death. He was appointed a Junior Lord of the Admiralty in 1807, and two years later he accepted the office of Secretary of State for War in the Duke of Portland's administration. This office he held during the governments of Perceval, Liverpool, Canning, Goderich, and Wellington—a period extending from 1809 to 1828—without, however, a seat in the cabinet until 1827. There was ample scope at the War Office for Palmerston's administrative talents and activity. The military system swarmed with abuses, and the labor thrown upon the Secretary of State for War during the Peninsular campaign was prodigious. Palmerston early attached himself to the Canning section of the Liverpool administration and accepted a seat in the cabinet of Canning. His official connection with the Tory party ceased in 1828, when Wellington insisted on accepting Huskisson's resignation, which was followed by Palmerston's retirement. The Duke's government was swept away in the reform flood of 1830, and Earl Grey, who became Prime Minister, offered the seals of the Foreign Office to Palmerston. The European horizon was so disturbed at this crisis that war seemed inevitable, but Palmerston brought about friendly relations with the new King of France, Louis Philippe, and, the two countries thus acting in reasonable harmony, the independence of Belgium was effected, and constitutional governments were established in Spain under Queen Isabella and in Portugal under Queen Maria. In addition to the above questions Palmerston had to deal with Eastern problems. He supported Turkey against Russian aggression. Later (1840) he united with Russia against France to curb the rising power of Mehemet Ali, apparently fearing that French influence in Egypt might endanger England's communication with India. The Opium War of 1840–42 resulted in the opening of five Chinese ports to trade. In 1841 the Quintuple Treaty to suppress the African slave trade was negotiated, but failed, being opposed by Lewis Cass, United States Minister to France, on account of the right of visitation clause. A strong foreign policy gave Palmerston during these years greater reputation abroad than in England. At home he favored free trade, labor laws, shorter hours, and factory acts.

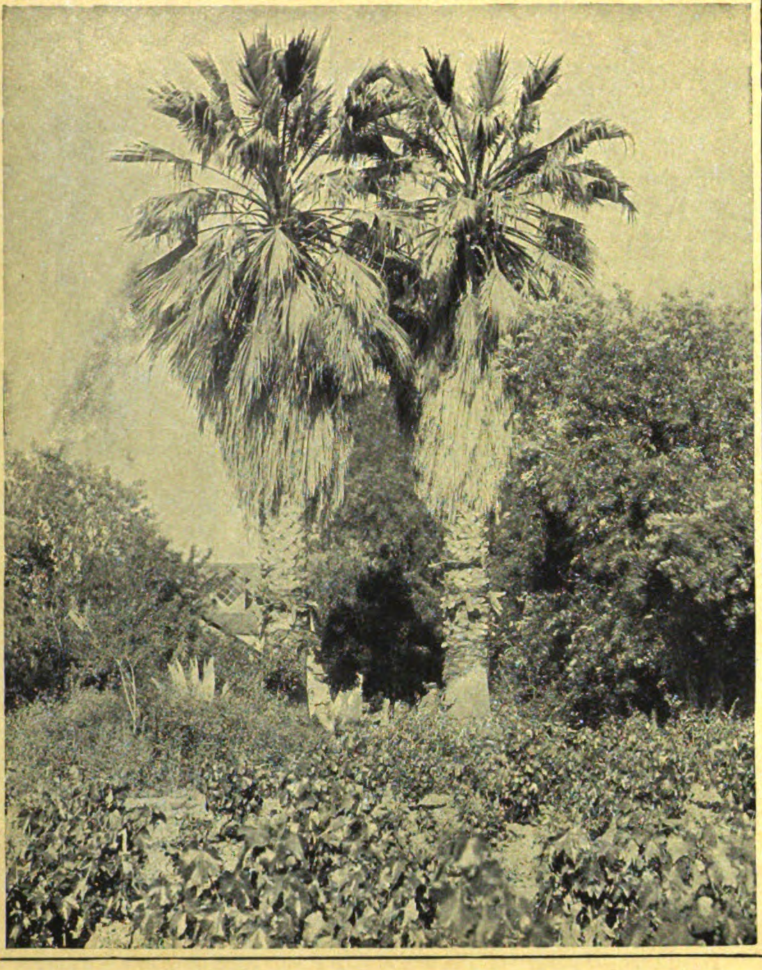
In 1841 Palmerston went out of office with the Whigs on the question of corn duties, but on their return in 1846 he resumed the seals of the Foreign Office. His second foreign administration furnished various subjects of hostile party criticism. A vote of censure on the foreign policy of the government was carried in 1850 in the House of Lords on the motion of Lord Stanley (afterward Earl of Derby). A counter resolution, approving the foreign policy of the government, was thereupon moved in the House of Commons. The debate lasted four nights. In December, 1851, however, Palmerston was dismissed from the Russell cabinet. He had in an unofficial oral way expressed his approbation of the coup d'état of Louis Napoleon without consulting either the Premier or the Queen; and, as explanations were refused, her Majesty exercised her right of dismissing her Minister. A few weeks later Palmerston avenged himself by bringing about the fall of the Russell administration on a comparatively trifling question regarding the militia. He refused an offer from the Earl of Derby to join the government which that statesman was commissioned to form, but accepted the post of Home Secretary in the coalition administration of the Earl of Aberdeen in 1852. The fall of this government, on account of the mismanagement in the Crimean War, placed Palmerston in the position of Prime Minister, to which he was unanimously called by the voice of the nation (February, 1855). He vigorously prosecuted the Russian War until Sebastopol was taken and peace was made. His government was defeated in March, 1857, on Cobden's motion condemnatory of the Chinese War. Parliament was dissolved, and Palmerston met the House of Commons with a large majority. But his administration fell in February, 1858, on account of the Conspiracy Bill, intended to protect foreign rulers against the machinations of plotting refugees. A short Conservative administration followed; but in June, 1859, Palmerston was again called to the post of First Lord of the Treasury and Premier, which he continued to fill to the day of his death. Oct. 18, 1865. His sympathies were always with oppressed nationalities, so he favored Italian unity, and opposed the War of Prussia and Austria against Denmark in 1864. It was his ambition to be considered the minister of a nation rather than the minister of a political party; and his opponents were constrained to admit that he held office with more general acceptance than any English minister since the time of Chatham. As an orator he was usually homely and unpretending, but always sensible and practical. He was a dexterous tactician and a ready, witty, and often brilliant debater. He was popular as a minister because he was thoroughly English in his ends and aims.

Bibliography. Lord Dalling (Sir Henry Bulwer) prepared the *Life of Palmerston to 1847*, in three volumes; this work was completed by Sir Evelyn Ashley in two additional volumes (London, 1870–76), who reëdited the entire work under the title of *Life and Correspondence of Henry John Temple, Viscount Palmerston* (2 vols., London, 1879); also Francis, *Opinions and Policy of Viscount Palmerston* (ib., 1852); L. C. Sanders, *Life of Viscount Palmerston* (ib., 1888); Marquis of Lorne, *Biography of Lord Palmerston* (New York, 1891); Walter Bagehot, *Biographical Studies* (London, 1899).

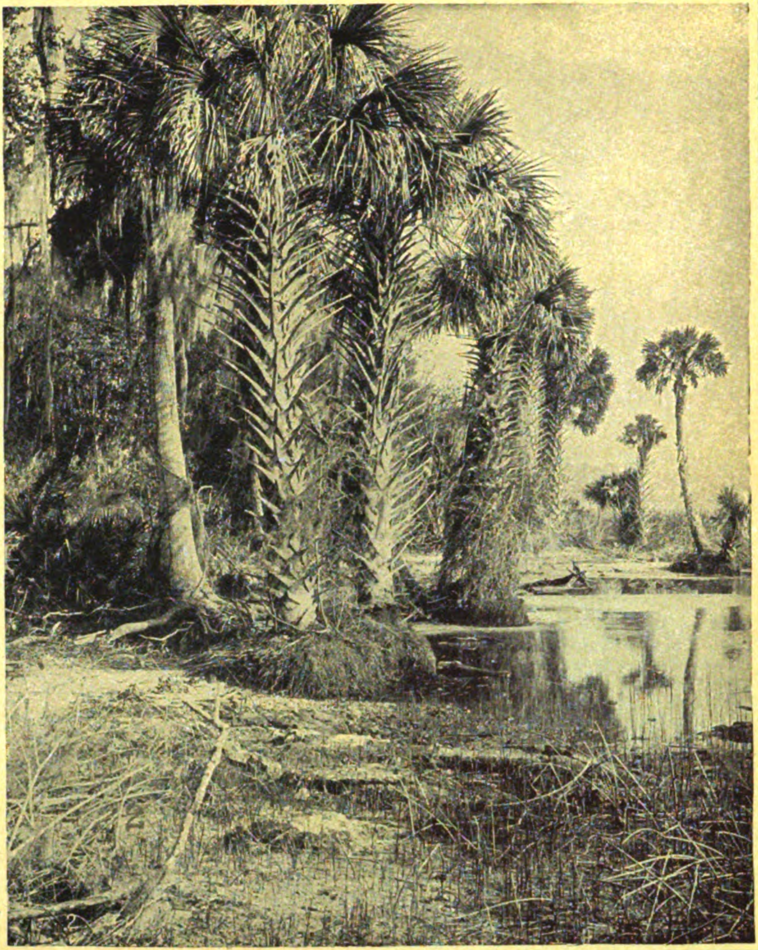
PALMETTE, păl-mĕt′. A conventional ornament, so called because of its resemblance to a palm leaf. It was used in both Egyptian and Assyrian art, whence it passed into Greek art, where it was speedily transformed into the anthemion (q.v.). It appears in both carved and painted ornament. Since the Renaissance it has been frequently applied in modern decoration.

PALMET′TO (from Sp. *palmito*, dim. of *palma*, palm), *Sabal palmetto*. A species of palm, a native of maritime parts of North America, from Florida to North Carolina, found farther north than any other American species of palm. It attains a height of 40 to 50 feet and has a crown of large palmate leaves, the blade from 1 foot to 5 feet in length and breadth and on a long petiole. The flowers are small, greenish, and in long racemes; the fruit black, about as long as a pea pod, and inedible. The leaves are made into hats, mats, etc., and are also largely used for thatch. The terminal bud or cabbage is eaten. The wood is extremely porous, but is preferred to every other kind of wood in North America for wharves, as it is very durable

PALMETTOS



OLD FAN PALMS (Washingtonia Filifera) AT PASADENA, CALIFORNIA



SABAL PALMETTO, FLORIDA

and not liable to be attacked by the teredo. A second American species, the saw palmetto (*Serenoa serrulata*), occurs from South Carolina to Florida. It has a short stem and numerous clustered fan-shaped leaves, while its berries have certain medicinal properties. A still smaller species is the dwarf palmetto (*Sabal adansonii*), a stemless species which bears a cluster of leaves a foot or two long. (See CABBAGE PALM.) The *Chamærops humilis* of the south of Europe is also called palmetto, and the name is applied to other species. See CHAMÆROPS.

PALMETTO, SAW. See Plate of PINES.

PALMETTO STATE. South Carolina. See STATES, POPULAR NAMES OF.

PALM HONEY. See JUBÆA.

PALMI, päl′mê. A town in the Province of Reggio di Calabria, Italy, on the southwest coast, 21 miles northeast of Reggio by rail (Map: Italy, E 5). It is situated on a slope of Mount Elia, the summit of which commands a magnificent view, and is surrounded by vineyards and orange and olive groves. The harbor affords good fishing. Pop. (commune), 1901, 13,297; 1911, 14,035.

PALMIERI, päl-myâ′rê, LUIGI (1807–96). An Italian physicist, born in Faicchio. He was appointed professor of physics at the University of Naples in 1847 and in 1854 became director of the meteorological and seismological observatory on the slope of Mount Vesuvius, whose eruptions and other phenomena he studied most carefully. He published a series of annals of this observatory (1869–73) and various studies in electricity, seismology, and volcanology. He was the inventor of a seismograph, an electrometer for the study of atmospheric electricity, and other meteorological instruments.

PALMIRA, päl-mē′rä. A town of the Province of Santa Clara, Cuba, 8 miles north of Cienfuegos, on the Cuban Central Railway (Map: Cuba, E 4). Palmira lies in the midst of a district producing largely sugar, corn, and tobacco. Pop., 1899, 4519; 1907, 4137.

PALMIRA, päl-mē′rä. The capital town of the province of the same name, in the Department of Valle del Cauca, Colombia, 160 miles southwest of Bogotá and 7 miles from the right bank of the Cauca. It is situated on a spacious plain called Llanos de Malagana, famous as a rich agricultural district and especially for the cultivation of a fine grade of tobacco. Stock raising is also an important industry. It was founded in 1794. Pop., 1912, 24,312.

PALMISTRY, päm′ĭs-trĭ. See CHIROMANCY.

PALMITIC (păl-mĭt′ĭk) **ACID**, $C_{16}H_{32}O_2$. One of the most important of the fatty acids. In a pure state, when crystallized from alcohol, it forms beautifully white acicular crystals arranged in tuftlike groups. These crystals are devoid of odor or taste, communicate a fatty feeling to the finger, melt at 62° C. (143.6° F.), and solidify on cooling in the form of crystalline scales. The acid is lighter than water, in which it is insoluble; but it dissolves freely in boiling alcohol and in ether, and the solutions have a distinctly acid reaction. In small quantities it may be distilled without decomposing if the heat be carefully regulated, and it may be distilled in any quantity under reduced pressure. The neutral palmitates of the alkalies constitute soaps and are soluble in warm water; if, however, their solutions are largely diluted with cold water, they are decomposed, an insoluble acid salt being precipitated, while half of the alkali remains in solution. The other most important compounds of palmitic acid are those which it forms with glycerin and with cetyl alcohol. With glycerin this acid forms three compounds, the most important of which is palmitin (q.v.). In combination with cetyl alcohol, whose composition is represented by the formula $C_{16}H_{33}OH$, it is the main constituent of spermaceti (q.v.), and as palmitate of melissyl it occurs in beeswax. The calcium salt of palmitic acid is found in adipocere, its sodium salt in blood and in serous fluids. Palmitic acid was first obtained from palm oil, whence its name. It may be obtained from oleic acid by fusing with caustic potash (see OLEIC ACID), but is now usually prepared either from Japan wax or myrtle wax.

PAL′MITIN, or TRIPALMITIN. A white fat, usually occurring, when crystallized from ether, in the form of a mass of small scaly crystals, insoluble in water, but readily soluble in ether and in boiling alcohol. It is a constituent of almost every kind of fat and is the preponderating ingredient in those of a semisolid consistence and in many oils. It receives its name from the abundance in which it occurs in palm oil, from which it may be readily obtained and then purified by recrystallization from ether. The true melting point of the pure substance is 62° C. (143.6° F.). (See STEARIN.) Chemically it is a compound formed by the union of one molecule of glycerin with three molecules of palmitic acid, three molecules of water being set free, according to the following equation:

$$\underset{\text{Glycerin}}{C_3H_5(OH)_3} + \underset{\text{Palmitic acid}}{3C_{15}H_{31}CO_2H} = \underset{\text{Palmitin}}{C_3H_5(OC_{15}H_{31}CO)_3} + \underset{\text{Water}}{3H_2O}.$$

It is saponified, or broken up into its constituents with formation of soap, by boiling with the caustic alkalies.

PALM OIL. An oil obtained from the pulp of the fruit of several species of palm. When fresh it is of an orange tint, sweetish taste, and violet-like odor. It has the consistency of butter, for which it is sometimes used, and, like butter, easily becomes rancid. It is used in candle and soap making, and, on account of its pleasant odor, as a scent to toilet preparations.

Palm-Kernel Oil is extracted from the crushed pits of the palm nut by pressure or solvents. It is white to pale yellow in color, with a pleasing smell and nutty flavor. It consists largely of laurin and is used in the manufacture of soaps and vegetable butter.

PALMS. See PALM.

PALM SAP. See JAGGERY.

PALM SUGAR. See JAGGERY; CARYOTA.

PALM SUNDAY (Lat. *Dominica Palmarum*). The last Sunday of Lent, so called from the custom of blessing branches of the palm tree, or of other trees substituted in those countries in which palm cannot be procured, and of carrying the blessed branches in procession, in commemoration of the triumphal entry of Christ into Jerusalem (John xii). The date of the origin of this custom is uncertain. The celebration of the day in Jerusalem is described in the *Perigrinatio Sylviæ* (between 378 and 394), but the ceremony of blessing the branches can hardly be referred to an earlier date than the ninth or possibly the eighth century. A procession is formed, the members of which issue from the church carrying branches in their hands and singing the hymn of Venantius Fortunatus, *Gloria, laus, et honor*. In the Greek church the book of the Gospels is borne in front. In some countries a priest, or occasionally a lay figure, was led at the head, mounted upon an ass, a usage which still exists in Spain and in Spanish America. Before their return to the church the doors have been closed, and certain strophes of the hymn are sung alternately by a choir within the church and by the procession without, when, on the subdeacon's knocking at the door with the shaft of the processional cross, it is again thrown open, and the procession reënters. During the singing of the passion in the solemn mass, which ensues, the congregation hold the palm branch in their hands, and at the conclusion of the service it is carried home to their respective houses, where it is preserved during the year. The ashes employed in the service of Ash Wednesday are made by burning the palms of the preceding year. Consult L. M. O. Duchesne, *Christian Worship* (2d ed., New York, 1905). For popular customs, J. H. Feasey, *Ancient English Holy Week Ceremonial* (London, 1897); Chambers, *The Book of Days* (2d ed., ib., 1906).

PALM SWIFT. A bird. See Swift.

PALM WEEVIL. See Grugru.

PALM WINE. See Nipa.

PALMY'RA (Lat., from Gk. Παλμυρά, trans. of Heb. *Tadmōr*, Tadmor, from *tāmār*, palm tree). The Greek Tadmor, connected by tradition with a city built by King Solomon (1 Kings ix. 18; 2 Chron. viii. 4), an ancient city in an oasis of the Syrian desert, 150 miles northeast of Damascus (Map: Turkey in Asia, D 3). It owed its importance to two springs of water which produced luxurious vegetation. Being halfway between the Orontes and the Euphrates, it became at an early date a caravan station for the trade between the Mediterranean and the Tigris-Euphrates valley. Its population was therefore always hybrid, though in the main Aramæan. The city is first mentioned in 41 B.C. in connection with the wars of Antonius against the Parthians, when the Triumvir made an unsuccessful attempt to possess himself of its riches. At an early time it was reckoned as belonging to the Roman Empire, though retaining a large measure of independence. No Roman troops were stationed here, and Palmyra had to patrol the district between Damascus and the Euphrates with her own troops. In the wars of Trajan the city was almost destroyed, but was rebuilt by Hadrian (130) and called Hadrianopolis or Hadriana Palmyra. It was made a Roman colony under Caracalla (212), receiving the *Jus Italicum*. In the course of time a semi-independent monarchy was developed here. Originally it was governed by a senate, at the head of which was a senator. The first senator of whom we have mention was Hairan, son of Wahballat (222–235), who took the name of Septimius. He was followed by his son Udainath (Odenathus), who in turn was succeeded by his son Hairan (Septimius Hairanes, died 255). He was followed by his brother Udainath II, who, though still called *Vir Consularis*, was made King of Palmyra and Viceroy of the Emperor for the East. After his death he received the high-sounding title of King of Kings (inscription of the year 271). The city itself was governed by another Palmyrene, Septimius Varodes, as procurator. Udainath took the part of Rome in her war against the Persian King Sapor, relieved Edessa, recovered Nisibis and Carrhæ (264), marched against Ctesiphon, drove out the Persians, expelled the Goths from Cappadocia, and marched into Emesa (266). He seems to have had Armenia, Cilicia, Cappadocia, Syria, and Arabia in his power. He was killed in the year 267. His son Wahballat (Athenodorus) was too young to rule, and the Prince's mother, Zenobia (q.v.) (in Palmyrene, Bat-Zabbai), wielded the sceptre in his stead. She bore the title Queen of Palmyra and the East, and she tried to free herself from Roman tutelage. Under her rule the Palmyrene realm reached its greatest extension. Her adviser and instructor in Greek was the Platonic philosopher Longinus. She defeated the Roman army under Heraclianus and attempted to add Egypt to her dominions, sending thither Zabdas with an army of 70,000 men. Though he occupied Alexandria for a time, he was driven out of Egypt (270) by Probus, the general of Aurelian. The Emperor himself marched against her in 272. Being only weakly supported by the Parthian Varahran, she was defeated in Syria, and Palmyra was besieged. Zenobia escaped to the Euphrates, but was captured and graced the triumph of the conqueror in 274. While Aurelian was on his way home the Palmyrenes rose, appointed a certain Antiochus their ruler, and massacred the Roman garrison. Aurelian turned back and destroyed the city (273), taking the most beautiful spoils of the temple to Rome. The city now lost its chief importance as a trade centre, the caravans being sent via Bosra and Ctesiphon. An attempt was made by Diocletian (284–305) to rebuild the city. It was the seat of the first Illyrian regiment and later became also the seat of a Christian bishopric. Justinian rebuilt the churches and the public buildings and placed a garrison there. The city, however, continued to decline. It was taken by the Arabs under Khalid in 634, destroyed again in 744, severely injured by an earthquake in 1157, and plundered by the Tatars under Tamerlane in 1401. Towards the end of the sixteenth century the Druse chieftain Man Oghlu fortified it; but the fortifications were destroyed by the Turks in the seventeenth century. Since then the place has been occupied by the Aneze Bedouins. The modern city is a miserable conglomeration of Bedouin huts, containing about 1500 souls.

Palmyra was an Aramæan city, thickly overlaid with Greek culture. Its municipality was patterned after those of the other Greek cities in the Roman Empire. Its officials had Greek titles. With the district around it, it formed a separate tariff union, the customs being collected by the community itself. The tariff of duties, engraved on stone, found in 1882, is in Palmyrene and Greek. The caravans formed regular associations, the leaders of which were the prominent and influential men of the place. There were also guilds of goldsmiths and silversmiths. Remains of a Jewish synagogue were found there by Euting in 1883 and Mitwoch in 1899. The ruins of Palmyra were discovered by Huntington in 1678 and were visited by Wood and Dawkins in 1751. Since then many travelers have described these ruins and have given an idea of the beauty and stateliness of this city in the desert at the time of its grandeur. The great temple of the Sun or Baal stood upon an immense terrace, 750 feet square, surrounded by walls 50 feet high. The temple court thus inclosed was adorned with double and triple colonnades on all four sides, employing 390 columns in all. There must have been numerous other shrines, as the Palmyrene pantheon was quite extensive; of two other important ruins one was a temple, the other either a temple or a columbarium. A quadruple colonnade of over 750 columns, each adorned with a statue, extended for over 4000 feet across the city, interrupted by a richly ornamented triple arch. The walls of Justinian still remain, as well as the ruins of a basilica, of the aqueduct, and of many beautifully carved commemorative towers. The Palmyrene language belonged to the western branch of the Aramaic family. The script is a development of the Aramaic branch of Semitic writing and is the direct parent of the square Hebrew. A large number of grave inscriptions have been found, not only in Palmyra itself, but also in Rome, Africa, and Britain, the latter set up by soldiers of Roman legions at one time quartered in Palmyra. Most of the grave inscriptions are accompanied by reliefs of the dead persons, most beautifully executed. The inscriptions are often bilingual, but two have been found in Dacia only in Latin. Other inscriptions have been found engraved upon clay medallions, which evidently served as talismans.

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PALMYRA. A city and the county seat of Marion Co., Mo., 12 miles southwest of Quincy, Ill., on the Chicago, Burlington, and Quincy Railroad (Map: Missouri, E 2). It has a public high school, a county hospital, a fine courthouse, fair grounds, and a "Big Spring." The industries are represented by flour and grist mills, a creamery, and a carriage and wagon factory. Settled in 1818, Palmyra was laid out in the following year and incorporated in 1855. The water works and electric-light plant are owned by the city. Pop., 1900, 2323; 1910, 2168.

PALMYRA PALM (named from the city of Palmyra in Syria), *Borassus flabelliformis.* A species of palm with a magnificent crown of fan-shaped leaves. It occurs throughout India and the Archipelago and in tropical west Africa. The stem attains a height of 20 to 70 feet and tapers slightly upward. The leaves are about 4 feet long, with spiny-edged stalks of about the same length, each leaf having 70–80 rays. The fruit is somewhat triangular, about the size of a child's head, having a thick, fibrous, and rather succulent yellowish-brown or glossy black rind, and containing three seeds each as large as a goose's egg. The Palmyra palm is the most common palm of India, growing spontaneously in many districts, cultivated in others, and reaching as far north as lat. 30°. It is one of the most valuable palms known, more than 800 uses having been enumerated for its different parts. It is of slow growth, and the wood near the circumference of the stem in old trees is very hard, black, heavy, durable, susceptible of a high polish, easily divided in a longitudinal direction, but very difficult to cut across.

This palm abounds greatly in the north of Ceylon, forming extensive forests; and the timber is exported to the opposite coast of India, being of superior quality to that which is produced there. It is much used in house building. The stalks of the leaves are used for making fences, etc. The leaves are used for thatching houses, for making baskets, mats, hats, umbrellas, and large fans, and for writing upon. Their fibres are employed for making twine and small rope. A fine down found at the base of the leaf-stalks is used for straining liquids and for stanching wounds. The Palmyra palm yields palm wine, arrack, and sugar (*jaggery*) of India. (See ARRACK.) The fruit is cooked in a great variety of ways and used for food. The seeds are jelly-like, and palatable when young. A bland fixed oil is extracted from the fruit. The young plants, when a few inches high, are esteemed as a culinary vegetable, being boiled and eaten generally with a little of the kernel of the coconut, and sometimes they are dried and pounded into a kind of meal. Multitudes of the inhabitants of the north of Ceylon depend almost entirely on the Palmyra palm to supply their wants. In the "Palmyra regions" of the southern Deccan vast numbers of the people subsist chiefly on the fruit of this palm.

The Deleb palm, so important to the inhabitants of Central Africa, formerly considered as a distinct species, is now believed to be a variety of the Palmyra palm.

PALMYRA WOOD. Properly this name applies only to the wood of the Palmyra palm (*Borassus flabelliformis*), but it is generally used for all kinds of palm-tree wood upon the market, of which very much is the wood of the coconut palm (*Cocos nucifera*) and the allied species (*Cocos plumosa*). These woods are also called speckled wood and porcupine wood by the dealers, the former name being applied to those veneers cut transversely and showing the ends of numerous black fibres mixed with the lighter-colored portions, and the latter to longitudinal sections, in which the mixed black and white fibres much resemble porcupines' quills.

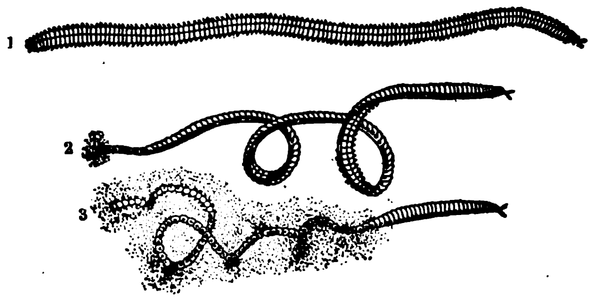
PALO, pä′lô. A town of Leyte, Philippines, situated on the northeast coast, at the mouth of the Malo Malo River, 6 miles south of Tacloban. Pop., 1903, 17,480.

PALO ALTO, pä′lo al′tô. A city in Santa Clara Co., Cal., 30 miles by rail south by east of San Francisco, on the Coast Division of the Southern Pacific Railroad (Map: California, C 5). It has a beautiful location and healthful climate, contains a Carnegie library in addition to several other fine buildings, and is the seat of Leland Stanford Junior University (q.v.) and of a large Roman Catholic theological seminary (St. Patrick's). Celery and berry growing constitute the chief industries of the locality. There are municipal water works and a municipal electric-light plant. Palo Alto was settled in 1890–91 and was incorporated in 1894. Pop., 1900, 1658; 1910, 4486.

PALO ALTO. A place in south Texas, eight miles northeast of Brownsville (q.v.), where on May 8, 1846, the first important battle in the war between Mexico and the United States was fought, 2300 Americans under General Taylor defeating about 6000 Mexicans under General Arista. It was essentially an artillery battle, though the Mexicans made a futile cavalry charge late in the day. Early on the following day General Arista retreated and took up a strong position at Resaca de la Palma (q.v.), where he was again defeated. The Americans lost at Palo Alto 7 killed, 47 wounded; the Mexican loss was 252 according to General Arista's report. Consult: H. O. Ladd, *The War with Mexico* (New York, 1883); H. H. Bancroft, *History of Mexico*, vol. v (San Francisco, 1885); O. O. Howard, *General Taylor* (New York, 1892); R. M. McElroy, *The Winning of the Far West* (ib., 1914). See MEXICAN WAR.

PALO DEL COLLE, děl kŏl′lě. A town in the Province of Bari delle Puglie, Italy, 12 miles southwest of Bari (Map: Italy, F 4). It is in a fruit-growing region and carries on a trade in wine, olives, and cattle. Pop. (commune), 1901, 12,851; 1911, 12,504.

PALOLO (pȧ-lŏ′lȯ) **WORM** (Samoan name, Fijian *mbalolo* or *bololo*). One of the annelid worms (*Eunice viridis*) allied to *Nereis*, which on a certain night in November appears in immense numbers at the surface of the sea near the shores of the Samoan and Fiji islands. It is then collected as food by the natives and considered a great delicacy. In this worm the sexual or hinder part of the body (epitoke), when the eggs or sperm are ripe, separates from the rest of the body and swims to the surface, where the reproductive elements are discharged, after which the worm collapses and dies. The swarming of this singular worm was observed by A. Agassiz at Bololo Point, Fiji Islands. On his arrival, before daylight, his guide fished up a few of the worms, and soon the water was full of them, both males and females, and men and women were catching them in all kinds of utensils. Their activity was wonderful, and the bursting of the animal when reproduction was over was most peculiar.



1, palolo worm, the anterior end of the body at the right; 2, the same discharging the sexual products in the water from broken front end of body; 3, the same breaking into pieces and discharging the sexual products from the rents. (After Mayer.)

The Atlantic palolo worm (*Eunice fuscata*) is abundant at the Dry Tortugas, Fla., near Porto Rico, and probably it will be found to be widely distributed. The animal commonly lies coiled upon itself within its burrow, and very often another worm (*Polynoë granulata*) is found sharing the same burrow. The worm does not live in a new and compact coral rock, or in coquina of recent formations, but abounds in that which is disintegrating and has become infested with *Pholas* shells, other worms, crustaceans, etc. The burrow of the palolo always opens outward at the surface of the rock, although so far as is known the worm never leaves its burrow permanently until the time of the breeding swarm. The Atlantic palolo swarms within three days of the time of the moon's last quarter, between June twenty-ninth and July twenty-eighth. When the swarm occurs the hinder end of the worm crawls out backward from the burrow and attempts to swim away from the anterior, nonsexual part, which remains within the burrow. A constriction appears, allowing the sexual portion to break away from the anterior part of the worm; and immediately the posterior end darts upward to the surface, upon reaching which it continues to swim hind end foremost very near to the surface of the ocean. The worms move in all directions and begin to discharge sperm or eggs through their genital outlets (nephropores), but the least stimulus, such as being lifted from the water, or the current from the stroke of an oar, will cause them to contract violently, often breaking themselves into fragments and casting the sexual products out through rents in the skin. This normally occurs as soon as the first rays of the sun fall upon the water, and in a few minutes after sunrise all the worms will have completely freed themselves of genital products, so that the ocean becomes milky with the vast quantity of sperm and eggs. Two or three hours after sunrise no worms remain to be seen. In a dense swarm there may be on an average about one worm per square foot over wide areas of the sea, commonest where the water is about 6 fathoms in depth. Great numbers of the worms are devoured by fishes as they sink, although they are not attacked to any great extent while on the surface. When set free the sexual ends swim vertically upward with such rapidity that they run little risk of capture, and this habit must be a great advantage to the worm. If the swimming worm be broken into fragments, each piece continues to swim backward in a normal manner, showing that the reaction is not controlled by any one ganglion, or localized group of ganglia, but that the whole sexual end of the worm is affected by the stimulus which causes the breeding swarm. Consult A. G. Mayer, "The Annual Breeding-Swarm of the Atlantic Palolo," in *Carnegie Institution Publication No. 102* (Washington, 1908).

PAL′OME′TA. See POMPANO.

PALOMINO DE CASTRO Y VELASCO, pä′lȯ-mē′nȯ dȧ kä′strȯ ē vȧ-lä′skȯ, ACISLO ANTONIO (1653–1726). A Spanish historical painter and author, born at Bujalance. He was educated at Cordova, where he also studied painting under Valdés Leal and Alfaro. Afterward he was associated with Claudio Coello at Madrid and became court painter in 1688. He painted a number of large frescoes at Valencia, Salamanca, Granada, and Madrid, good in design and color. His chief importance, however, lies in his book *El museo pictórico y escala óptica* (1715–24), which contains a history of painting and a biographical dictionary of eminent Spanish artists. The latter, though showing partiality and credulity, is of great importance to the historian of Spanish art and furnished much of the material for the later work of Cean-Bermudez. It was translated into English in 1739, into French in 1749, and into German in 1781.

PALOOS, pä′lo͞oz, or PALUS. A tribe of Shahaptian stock (q.v.), occupying the country about Palouse River and the adjacent portion of Snake River in southeastern Washington. They are closely connected with the Nez Percé and Yákima. They now number but 82.

PALOS, pä'lōs, or Palos de la Frontera. A small town on the southwest coast of Spain in the Province of Huelva, near the mouth of the Río Tinto (Map: Spain, B 4). It was formerly an important port, and from here Columbus set sail with his three caravels on Aug. 3, 1492, on the voyage which resulted in the discovery of America. Pop., 1900, 1619; 1910, 1902.

PALO VERDE (pä'lō vĕr'dȧ) **TREE.** See Parkinsonia.

PALOWAN. See Palawan.

PAL'PITA'TION (Lat. *palpitatio*, from *palpitare*, to throb, frequentative of *palpare*, to feel, move quickly). The term used to signify pulsations of the heat so inordinately forcible as to make themselves felt and frequently to give rise to a most troublesome and disagreeable sensation. It may be either functional or a symptom of organic disease of the heart. Although it may be persistent, it far more frequently comes on in paroxysms, which usually terminate within half an hour, recurring afterward quite irregularly, sometimes daily or several times a day and sometimes not till after a long interval. The attack often comes under some mental or physical excitement, but sometimes when the patient is quite composed or even asleep. If the paroxysm is a severe one, the heart feels as if bounding upward into the throat; and there is a sensation of oppression over the cardiac region, with hurried or even difficult respiration and even nausea. In milder attacks there is simply a consciousness of sinking or fluttering of the heart.

Palpitation is due to many different causes. It is more common in women than in men and is apt to occur especially at puberty, the menstrual periods, and the menopause. Anæmia is a frequent cause. Palpitation is present in unstable states of the nervous system, such as occur in neurasthenia, hysteria, worry, anxiety, and excitement. The excessive use of tea, coffee, alcohol, and tobacco predisposes to cardiac irregularities. Perhaps the most frequent cause is flatulent distention of the stomach, acting both reflexly and directly. Palpitation is a symptom of exophthalmic goitre, and lastly it is a concomitant of organic disease of the heart itself. Either hypertrophy or degeneration of the cardiac muscle may produce it as well as affections of the valves.

The treatment of palpitation naturally depends on the causation. When the stomach is at fault dietetic errors will need to be corrected. Tea, coffee, alcohol, and tobacco should be interdicted, since they not only affect the nerves but hurt the digestion. During the paroxysms relief may be had from the diffusible stimulants, as ammonia in the form of the aromatic spirit.

PALSGRAVE, pạlz'grȧv, John (c.1480–1554). An English grammarian, chaplain to Henry VIII. He was born in London, studied at Corpus Christi College, Cambridge, and at the University of Paris, and taught French to Henry's sister, the Princess Mary, whom he accompanied to Paris on her marriage to Louis XII. Thanks to her favor, he was rapidly advanced in ecclesiastical honors. About 1517, as we know from the testimony of Sir Thomas More and of Erasmus, Palsgrave studied at Louvain, and, eight years after, he was appointed tutor to the Duke of Richmond, a natural son of Henry VIII. Palsgrave is known now as the author of one of the earliest French grammars for English use, *Lesclarcissement de la langue francoyse* (1530), a work which still has value as a treasury of idiomatic English of this unliterary period. It is very rare (the only known copies being two in the British Museum and one in the Mazarin Library in Paris) and was reprinted in France in 1852. Palsgrave translated into English Fullonius' Latin comedy *Acolastus* (1540).

PALSY, pạl'zi. See Paralysis; Paralysis Agitans.

PALSY, Scriveners'. See Neurosis.

PALSY, Wasting. See Muscle, Diseases of.

PALTOCK, pạl'tŏk, Robert (1697–?1767). An English author, born in London. He was educated at St. Paul's School, studied law, and lived all his life in London. His brilliant and striking romance, *The Life and Adventures of Peter Wilkins, a Cornish Man*, which appeared first in 1750, was published anonymously, and the author was not known for several years. It was a highly original work and appeared in French (1763) and German (1767) translations. It was warmly praised by Leigh Hunt, Sir Walter Scott, Coleridge, Charles Lamb, and Robert Southey, who declared that the winged people described by Paltock "are the most beautiful creatures of imagination that ever were devised." A reprint, with a preface by A. H. Bullen, was published in 1884.

PALTSITS, pạl'sīts, Victor Hugo (1867–). An American historian and bibliographer, born in New York City, where from 1888 to 1907 he was connected with the Lenox Library (now part of the New York Public Library). He then served as State historian until 1911 and thereafter was engaged in private historical work on the iconography of Manhattan. Besides editing various historical documents, Paltsits is author of *Bibliography of the Works of Philip Freneau* (1903); *Bibliography of the Works of Father Louis Hennepin* (1903); *Lewis and Clark Bibliography for Original Journals of Lewis and Clark* (1904); *Bibliography of the Writings of Baron Lahontan* (1905); *Scheme for the Conquest of Canada in 1746* (1905); *The Almanacs of Roger Sherman, 1750–1761* (1907).

PALUDAN-MÜLLER, pä'lụ-dȧn-mụl'lĕr, Frederik (1809–76). A Danish poet, born at Kjerteminde. He entered the University of Copenhagen in 1828, studied law there, and afterward traveled abroad. As early as 1831 he became known through some of his poems. A year afterward his play *Kjærlighed ved Hoffet* (Love at Court) was successful, and the Byronic *Danserinden* (1833) and the lyric drama *Amor og Psyche* (1834) established his reputation. But his most important work is *Adam Homo* (3 vols., 1841–48), a novel in verse. His other writings include: *Abels Död* (1854), *Dryadens Bryllup* (1844), *Benedikt fra Nursia* (1861), *Paradiset* (1861), *Ahasverus* (1854), *Kalanus* (1854), the last a notable poem on the life of the Indian sage, and *Adonis* (1874), a romance, also in verse. His *Poetiske Skrifter* were published in eight volumes in 1878–79. His two prose works, *Ungdomskilden* (*The Fountain of Youth*, 1865) and *Ivar Lykkes Historie* (3 vols., 1866–73), are among his most characteristic productions, although it is as a poet that he is best known.

PAL'UDISM. See Malaria and Malarial Fever.

PA'LY. A term in heraldry (q.v.).

PAMEKASAN, pä'mē-kȧ-sän'. The capital of the island of Madura (q.v.).

PAMELA, păm'ė-lȧ, or Virtue Rewarded. A novel by Samuel Richardson (1740). With all its defects it is of interest as marking the starting point of the modern novel.

PAMIERS, pȧ'myȧ'. The capital of an arrondissement and an episcopal see in the Department of Ariège, France, on the Ariège, 40 miles south of Toulouse (Map: France, S., F 5). It has a seventeenth-century cathedral of mixed architecture, a communal college, a school of commerce, a seminary, and a large hospital. It manufactures hardware, woolens, paper, lumber, brick, and flour; has iron foundries and a trade in corn and wine. Pop., 1901, 10,886; 1911, 10,017.

PAMIR, pȧ-mēr', or The Pamirs (Pers. *Bām-i-dunyā*, roof of the world) (Map: Asia, J 5). An elevated mountain region in Central Asia, forming in greater part the southeast corner of Russian Turkestan, and bounded by Chinese or East Turkestan on the east and Bokhara and Afghanistan on the west, while on the south a narrow projection of Afghanistan separates it from the extreme northwestern part of British India (Map: Asia, G 5). It stretches in either direction about 150 miles, and its area is estimated at 36,000 square miles. Along its east boundary runs the short but lofty Sarikol Range, which is the nucleus from which the four great mountain systems of Central Asia radiate, the Hindu Kush towards the west, the Himalaya to the southeast, the Kuen-lun to the east, and the Tian Shan to the northeast, and the divide between the Oxus River and the streams of Kashgar. The culminating point of the Sarikol is the Mustagh-ata, 25,790 feet (some estimates are as low as 23,000 feet) above the sea, on whose slopes are many mighty glaciers. Westward the Sarikol sends out a number of parallel spurs or cross ranges dividing the country into level-floored valleys 4 or 5 miles broad. These valleys are the true Pamirs, form the characteristic feature of the country, and lie from 10,000 to 14,000 feet above sea level. They differ in formation from the Tibetan Plateau and seem to have been originally deep river gorges which have been filled with detritus from the mountain sides. They are watered by the head streams of the Oxus and contain a number of beautiful lakes of glacial origin. For about seven months the land is buried in snow and the passes are blocked; the summer is, however, exhilarating, but there is always a tendency to strong winds. The mean January temperature at 12,500 feet is —13° F.; the mean July, 62° F. The country is treeless, but the valley floors are covered with grass which yields rich pasture in summer. Of the entire region but one-tenth is pasture, the remainder is a mountainous tract.

Though there is a considerable population in the extreme western valleys, the population of Pamir proper, or Russian Pamir, is very sparse, consisting only of a few hundred nomadic Kirghiz seeking the pastures during summer. The great plateau of Pamir was formerly regarded as the place of dispersion, if not of origin, of the Aryan or Indo-European peoples. Its ethnological importance is lessened by the fact that the best opinion among investigators of Aryan prehistory to-day fixes the seat of this great branch of the white race in some part of north or east Europe. The Pamirian region is, however, interesting from the fact that about it cluster Aryan peoples of a rather primitive sort, the remnants, in all probability, of the Aryan invasion of Asia and the representatives of a comparatively undeveloped Aryan character. Eastward of the Pamir was also the primitive home of the Chinese, while north of it lay the region of development of the Tatar or Turkic peoples. South of it various Aryan tribes have lived and wandered for ages. Here naturally, as languages, religions, customs, and habits show, considerable intermingling of races has taken place.

Considerable interest has been centred around Pamir owing to its frontier position between Russian and British possessions, and during the last three decades of the nineteenth century it was probably more thoroughly explored than any other part of Central Asia. Great Britain desired in 1891 to have the region portioned between Afghanistan and China, but in the same year Russia sent an official expedition into the country in order to substantiate its claims. In 1895 the boundaries were defined as outlined above by a treaty between Russia and Great Britain. Russia has established a fortified outpost, Pamirsky Post, on the Murghab River. Consult: Geiger, *Die Pamirgebiete* (Vienna, 1887); Bonvalot, *Through the Heart of Asia* (London, 1889); Dunmore, *The Pamirs* (ib., 1893); Cobbold, *Innermost Asia* (New York, 1900); F. B. and W. H. Workman, *Ice-Bound Heights of the Mustagh* (ib., 1908).

PAMIR SHEEP. See Plate of Sheep, Wild.

PAMLICO (păm'lė-kō) **SOUND.** The largest of the numerous sea lagoons which line the east coasts of the United States. It is separated from the ocean by a narrow beach which stretches from Bodie Island Lighthouse to Cape Hatteras, about 35 miles, and west-southwest for about the same distance (Map: North Carolina, F 2). This beach is in places no more than a quarter of a mile wide, but there are only three inlets which are navigable from the sea, Oregon Inlet, Hatteras Inlet, and Oracoke Inlet. Measuring along the middle of the sound from Croatan Sound, the northeastern outlet, to Core Sound, the southwestern outlet, the distance is about 60 miles, and the greatest width—from Cape Hatteras to the northwest—is about 24 miles. The Neuse and Pamlico rivers enter the sound through large estuaries, and north of Roanoke Island the Pamlico connects with the Albemarle Sound (q.v.). The oyster fisheries on the Pamlico are important, and large flocks of wild fowl frequent its waters.

PAMMARI, pȧm-mä'rė. An Indian tribe of Brazil. See Puru-Puru.

PAMPA, păm'pȧ, La. A territory of Argentina, bounded on the north by the provinces of Mendoza, San Luís, and Córdoba, on the east by Buenos Aires, on the south by the Territory of Río Negro, and on the west by the Province of Mendoza (Map: Argentina, G 5). Its estimated area is 56,320 square miles. The territory is formed almost wholly of pampas, with some forest regions and a few chains of low hills in the centre. The only important river, Río Salado, flows into Lake Urre Lanquén, which empties intermittently through the Curaco into the Río Colorado, on the south boundary. There are also many other lagoons and small lakes. The climate is dry and healthy, and the soil is fertile. Agriculture is the chief industry. Wheat, alfalfa, linseed, maize, and barley are produced.

Stock raising also is carried on extensively. There is some manufacturing, and large quantities of wheat, maize, and linseed are exported. The territory has railway connection with the coast. Capital, Santa Rosa de Toay (pop., 8000). The population of the territory in 1895 was 25,914; in 1914 (est.), 100,000.

PAMPANGA, päm-pän′gȧ. A province of central Luzon, Philippines. It is situated north of Manila Bay and bounded on the north by Tarlac and Nueva Ecija, on the east by Bulacán, and on the west by Zambales and Bataan (Map: Philippine Islands, C 3). Area, 2209 square miles. It is mountainous in the west, but the east and south portions are taken up by a part of the low and marshy delta of the Río Grande de la Pampanga. Agriculture is extensively carried on, yielding rice, sugar cane, corn, sweet potatoes, tobacco, indigo, and cotton. Industries are also well developed; just before the Spanish-American War there were over 12,500 looms and 177 steam sugar mills in operation. Pop., 1903, 223,754, chiefly of the Pampanga race. The capital is Bacolor (q.v.).

PAMPANGA. A Christianized people of central Luzon. At the time of the Spanish conquest they were almost identical with the Tagalog, from whom they were distinguished only because of dialectic differences. See Philippine Islands.

PAMPANGA, Río Grande de la. The second largest river of Luzon, Philippines, draining the greater part of the large central plain which lies between Manila Bay and the Gulf of Lingaven (Map: Philippine Islands, F 3). It rises on the Caraballo Sur and flows southward through the provinces of Nueva Ecija and Pampanga, taking up the tributary Pampanga Chico and emptying into Manila Bay through the numerous ramifications of a large marshy delta. It is about 125 miles long and receives several large and innumerable small tributaries. In the rainy season its inundations cover large extents of territory, which are converted into excellent rice fields.

PAMPAS, päm′pȧz (Sp., Portug. *pampa*, from S. Amer. Indian *pampa*, Quichua, *bamba, banba*, plain). The designation of certain plains in South America. In Peru the name is applied to the forested region along the Ucayali River and also to the dry lake basins on the Andean Plateau. The more common signification of the term, however, refers to the immense grassy plains which occupy the central part of Argentina between the Río Salado on the north and the Río Negro on the south, and which merge into the forested region of the Gran Chaco and the steppes of Patagonia. The pampas comprise an area of about 250,000 square miles, with a flat or gently undulating surface sloping towards the southeast and south. On their western border the elevation ranges from 1000 to 1300 feet above the sea, while along the Atlantic it is generally less than 100 feet. The soil is mostly clay of Quaternary and Tertiary age. During the wet season a luxuriant growth of grasses covers the plains, affording pasturage to great herds of cattle and flocks of sheep. A portion of the region along the Paraná is adapted to agriculture, and there are smaller areas of arable land in the interior. In the northern and western parts the surface is often broken by deep ravines or barrancas and by shallow depressions which are filled with brackish water during a part of the year. Strips of sandy, arid land are known as travesías. The inhabitants comprise European immigrants and the half-wild gauchos of mixed Spanish and Indian blood, who are chiefly occupied in hunting and grazing. See Argentina.

PAMPAS CAT. A robust, yellowish-gray wild cat, of the Argentine pampas and La Plata valley. It is striped with straw-colored bands running obliquely backward across the flanks and horizontally on the chest and legs. It has an exceedingly short head, and only two premolar teeth in the upper jaw. Other names are grass cat and straw cat. Hudson (*Naturalist in La Plata*, London, 1892) speaks of it as one of the most characteristic animals of the pampas, and Mivart notes the resemblance between it and Pallas's cat (*Felis manul*) of the steppes of Russia.

PAMPAS DEER. A small deer of Argentina (*Cervus campestris* or *Blastoceros bezoarticus*). In eastern South America is another member of the same genus, sometimes called marsh deer (*Blastoceros paludosus*), with short, stout antlers, each beam with two double bifurcations. See Plate of Fallow Deer, Musk, etc., with Deer.

PAMPAS DEL SACRAMENTO, dĕl säk′-rȧ-mĕn′tô. An extensive plateau region in Peru between the Huallaga and Ucayali rivers, and between lat. 5° and 10° S. It consists largely of open savanna country and was settled by Jesuit missionaries in the middle of the eighteenth century, but is now sparsely inhabited.

PAMPAS GRASS (*Gynerium argenteum*). A grass common in Brazil and Argentina, usually along watercourses, and not, as formerly stated, upon the pampas or vast plains of South America. It has been introduced into various countries as an ornamental plant. It is quite hardy in England, but requires protection in winter as far north as New York. Its tufts have a splendid appearance. The leaves are 6 to 8 feet long, the ends hanging gracefully; the flowering stems 10 to 14 feet high; the panicles of flowers silvery white and from 18 inches to 2 feet long. The herbage is too coarse to be of any agricultural value. The male and female flowers are on separate plants, in panicles, the paleæ of the female florets elongated, awn-shaped, and woolly. The pampas grass is grown commercially in California, where it was introduced about 1880. Another Brazilian species of the same genus, uva grass (*Gynerium saccharoides*), yields a considerable quantity of sugar. Stapf, in a monograph of this genus, published in 1897, separates the genus, placing the pampas grass and allied species in the genus *Cortaderia*, and leaves *Gynerium saccharoides*, or uva grass, in the genus *Gynerium*. For illustration, see Grasses.

PAMPAS HARE. See Agouti.

PAMPELUNA, päm′pȧ-lōō′nȧ. A city of Spain. See Pamplona.

PAMPERO, päm-pā′rô. A cold, dry wind which frequently sweeps over the pampas or plains of Argentina and Uruguay. At times it develops hurricane force and causes much damage to light buildings and shipping. It is similar to the northwest gales of the Northern Hemisphere, but, unlike the latter, has no hills or mountains to reduce its force.

PAM′PHILUS (Gk. Πάμφιλος). A Greek grammarian and lexicographer of the first century A.D., author of an important Greek lexicon, in 95 books (books i–iv were by Zopyrion). Of this work, now lost, we have an epitome by Diogenianus (q.v.). Consult L. Cohn, "Griechische

Lexikographie," vol. ii, part i, pp. 689–690, of Müller's *Handbuch der klassischen Altertumswissenschaft* (4th ed., Munich, 1913).

PAMPHILUS (Lat., from Gk. Πάμφιλος, *Pamphilos*). A Greek painter of the early fourth century B.C. He was a native of Amphipolis, but studied and lived at Sicyon, where he succeeded his master, Eupompos, as the head of the Sicyonian school. Among his works were a "Battle at Phlius," painted for the Athenians; "Odysseus on the Raft"; and apparently a "Cognatio," or "Relationship," which may have been a family group, though the text of Pliny is probably corrupt at this point (*Historia Naturalis*, xxxv, 96). He was noted for his thorough technical knowledge; he insisted that arithmetic and geometry were necessary to the painter, thus performing for painting a service similar to that which the Canon of Polyclitus did for sculpture. Through his influence, we are told, drawing was introduced into the schools as part of the education of free-born boys.

PAMPHILUS OF CÆSAREA (?–309). A Christian teacher and writer of the fourth century. He belonged to a good family of Berytus (Beirut), Syria, studied under Pierius of Alexandria, and spent most of his life as a priest at Cæsarea in Palestine, where he founded a Christian school and established a valuable and celebrated ecclesiastical library, whence Eusebius drew much of the sources for his History. It was extant in the sixth century, but probably was destroyed after the capture of Cæsarea by the Moslems in 638. He multiplied copies of the Scriptures and gave liberally to the poor. He was an admirer of Origen and teacher of Eusebius, who took the name of Eusebius Pamphili. With Eusebius he prepared an edition of the *Septuagint* from the text in Origen's *Hexapla*, which was generally used in the Eastern Church. During the persecution under Maximinus he was imprisoned (307–309) and employed himself in writing an apology for Origen in five books, to which Eusebius added a sixth. All of the work has perished, and our knowledge of it depends upon the untrustworthy Latin translation by Rufinus of book i and Photius' summary. Pamphilus died a martyr in 309. Consult his literary remains in Migne, *Patrol. Græca*, x, xvii, and Adolf Harnack, *Altchristetische Literatur* (new ed., Leipzig, 1904).

PAM'PHLET (of uncertain etymology). A small book, whether stitched or bound, with or without covers, designed as a controversial tract. On its first appearance among English writers the word seems to have been used to designate any booklet, whatever its aim. It was so employed by Richard of Bury (died 1345) in his *Philobiblon*, a Latin handbook to his library at Durham College; and by Caxton in his *Eneydos* (1490), where printed matter is classed as "paunflettis and bookys." Sometimes single pieces of verse in manuscript or in print were also called pamphlets by the poets of the fifteenth century. But since the Reformation, when pamphlets began to be employed in controversy, they have come to stand mainly for a class of writings that deal with questions of the day, in politics, religion, literature, etc. They are thus to be differentiated from academic theses and dissertations and from all other short scientific treatises written with a calm didactic aim. Besides being brief, pamphlets are often spirited in style and vehement and angry in tone. The sober pamphlet is represented by Sidney's *Apology for Poetry*, and the vehement by Milton's *Tenure of Kings and Magistrates*. Both are pamphlets by virtue of their controversial aims. There seems to have been little in ancient literature to correspond with the modern pamphlet. Pamphlets, however, showered over Europe, especially after the invention of printing. In France a pretty full record of popular thought and feeling from the pre-Reformation days to the Panama prosecutions, the Dreyfus case, and after, might be drawn from this source. And in Germany, the cradle of printing, the pamphlet was a weapon which was skillfully and effectively wielded by the Reformers against the Pope and the Roman church, and in turn by the Pope and the church against the Reformers; and it is in Germany to the present hour a trusty weapon of offense and defense.

A history of English pamphlets would fall little short of a history of English institutions from the establishment of the house of Tudor to the death of George III. In them as nowhere else is to be found the story of the fierce controversies whereby Protestantism won against the Roman Catholic church, and whereby the English people wrested from their kings their social and political rights. Several hot debates have also marked the course of our literature. Somewhat earlier than the date here assigned, the pamphleteer was abroad. Wiclif, e.g., circulated among the people little sheets copied by the poor priests, in which an appeal was made against the abuses of the professional clergy and against the current authority in religion. Of these tracts the *Septem Hereses* is perhaps the most famous. The beginning of the Reformation in England has been ascribed, of course with exaggeration, to the *Supplyoacyon of Beggars* (1529) of Simon Fish, copies of which were strewn abroad in the streets of London, apparently with the connivance of Henry VIII. As no other pamphlet had yet done, it hit the public view concerning "the ravenous wolves going in shepherds' clothing and devouring the flock." With little effect Sir Thomas More replied to Fish in the *Supplyoacyon of Soulys*. This incident is but an example of what was taking place everywhere throughout the Reformation period. Erasmus, Luther, and Melanchthon were all pamphleteers. The Anglican church was no sooner established than it was attacked by the Puritans, e.g., by Thomas Cartwright in an *Admonition to the Parliament* (1572). Then followed the Martin Marprelate controversy (q.v.), the most heated religious dispute in the reign of Elizabeth. At this time, too, were debated, in stitched sheets of varying length, questions in literature, especially the essence and form of poetry and the principles underlying the drama. In these discussions some of the great Elizabethans bore a hand, like Campion, Daniel, and Sidney.

Numerous as were the pamphlets in the Elizabethan age, they were but a sign of the deluge that was to come during the great Civil War, when the passions of sects and factions ran high. Prynne alone, it is estimated, was the author of nearly 200 pamphlets, of which may be cited *A Looking Glass for All Lordly Prelates*. If he was the most prolific of all the Puritan pamphleteers, it must be remembered that he was only one among hundreds. Indeed, on both the Puritan and Royalist sides the news-letters which were issued in all the larger towns were little more than controversial pamphlets. Milton dropped his poetry and entered the lists on a variety of questions, discussing in turn education, divorce, the press, and the right to put to death kings and magistrates. Substantial as are Milton's tractates, as he sometimes called them, he was surpassed in brevity and directness by Col. Edward Sexby in *Killing No Murder* (1657), addressed to "His Highness, Oliver Cromwell," and containing the memorable sentence: "Let this consideration arm and fortify your Highness's mind against the fears of death, and the terrors of your evil conscience, that the good you will do by your death will something balance the evils of your life."

After the Restoration (1660) freedom to print was strongly repressed by the government, and pamphlets had to be printed and circulated privately. Still, one should not forget *A Rough Draft of a New Model at Sea* (passed about in manuscript during 1667), in which George Savile, Marquis of Halifax, attacked the scandalous behavior of the navy in the war with the Dutch; nor the protests of the Quaker George Fox against the formalism of the Established church; nor the virulent debate between Samuel Parker and Andrew Marvell on the relation of church and state. Much of the literature of the time, as Dryden's essays and satires, was also controversial in tone and was issued in pamphlet form.

Dr. Johnson was probably right in describing the reign of Queen Anne as par excellence the age of pamphlets. The revolution of 1688 had transferred political power to the House of Commons; two great parties, Whig and Tory, had come into existence, depending for the retention of office upon the people; and by the lapse of the licensing act, in 1695, the press had become practically free. As the newspaper had not yet become thoroughly organized, the pamphleteer was a necessity for explaining, defending, and attacking public policies. Party spirit extended to literary questions, and dissent from the state church was assuming new forms. Under these circumstances the pamphleteer reaped a harvest. To pass over the horde of minor writers, the Marquis of Halifax, already mentioned, paid his compliments to Whig and Tory in *Some Cautions for the Choice of Members of Parliament* (1695) and gave the Dissenters some excellent advice in *A Letter to a Dissenter* (1687), a tract that went everywhere and provoked a score of replies. Defoe, in *The Shortest Way with the Dissenters* (1702), urged the complete extirpation of all Dissenters—a piece of irony surpassed only by Swift. Charles Leslie—"a reasoner not to be reasoned against," said Dr. Johnson—rode roughshod over Quakers and Deists. William Law attacked the latitudinarian opinions of the Bishop of Bangor, and 200 pamphlets followed from 50 different pens. Of all his contemporary pamphleteers, Swift was easily the prince. His *Argument to Prove that the Abolishing of Christianity . . . May be Attended with Some Inconveniences* (1708) is a superb example of ironical humor. Swift also performed valuable services to the Tories in many pamphlets, of which may be mentioned *The Conduct of the Allies* (1711) and *Some True Thoughts upon the Present State of Affairs* (1714). The condition of Ireland was handled in a masterly manner in the *Drapier's Letters* containing the famous "Modest Proposal." With Arbuthnot, Pope, and others, he joined in excellent foolery aimed against literary quacks and poetasters. Of this joint work the best is perhaps *The Art of Political Lying* (1712) mostly from Arbuthnot, though Swift bore a hand.

Later in the eighteenth century there were other debates in which were active Bolingbroke, "Junius," who may have been Sir Philip Francis, and Burke. The great reviews soon after 1800 turned controversy into new channels. Still the war of pamphlets has never quite ceased. Bowles and Byron fought over the question as to whether Pope was a poet; and pamphlets played an important part in the discussion over the poor laws, the corn laws, the Crimean War, the Irish land laws, the Armenian massacres, and the struggles between the shifting parties in the Church. Even nowadays a poet occasionally challenges his reader by issuing his verse in pamphlet form. Such, e.g., seems to be the intent of John Davidson, who began in 1901 a series of verse pamphlets dealing with the religious and philosophical questions of special interest at this time.

Bibliography. For a general history of the subject: M. Davies, *Eikōn mikro-biblikē; sive, Icon Libellorum, or a Critical History of Pamphlets* (London, 1715); William Oldys, "History of the Origin of Pamphlets," in J. Morgan, *Phœnix Britannicus* (ib., 1732); Robert Blakey, *History of Political Literature from the Earliest Times* (2 vols., ib., 1855); Alexander Andrews, *History of British Journalism* (2 vols., ib., 1859); Arthur Waugh, *The Pamphlet Library* (4 vols., ib., 1897-98). This work contains examples of political, religious, and literary pamphlets, from Wiclif to Newman. There are also historical essays under each division. Useful articles on the subject are to be found in *Revue des Deux Mondes* (Paris, April 1, 1846); *Irish Quarterly Review*, vol. vii (Dublin, 1857); *Edinburgh Review* (Edinburgh, October, 1855); and *Quarterly Review* (London, April, 1908).

PAMPHYL′IA (Lat., from Gk. Παμφυλία). In ancient geography, a country on the south coast of Asia Minor, with Cilicia on the east and Lycia on the west (Map: Rome, F 3). On the north it was separated from Pisidia by the Taursu Range, and the southern limit was formed by the crescent-shaped Gulf of Attalia. The population was a mixed race, in which there was a strong Greek element, and the inscriptions show a dialect strongly resembling that of Cyprus and Arcadia, which seems to indicate Greek immigration prior to the Dorian conquest of the Peloponnesus. The chief cities, Perge, Sillæum, Aspendus, and Side, were Greek, but the country early lost touch with the mother country and plays no part in Greek history, though it was on the river Eurymedon in Pamphylia that the Athenian Cimon won his great victory over the Persians. The country was freed from the Persian rule by the conquests of Alexander and after his death passed into the hands of the Seleucid kings of Syria. With the rise of Pergamum it became a part of that Kingdom, and Attalus II founded the city of Attalia, now Adalia. With the rest of the Kingdom it passed to the Romans and from this time shared the history of the rest of Asia Minor. For the inscriptions, consult Collitz, *Griechische Dialekt-Inschriften*, vol. i (Göttingen, 1884); also Lanckoronski, *Die Städte Pamphyliens und Pisidiens* (Vienna, 1890); Sir W. M. Ramsay, *Historical Geography of Asia Minor* (London, 1890); Hans Rott, *Kleinasiatische Denkmäler aus Pisidien, Pamphylen, und Kappadocien* (Leipzig, 1908).

PAMPLONA, pȧm-plō′nȧ (often called by

English writers **PAMPELUNA**, păm′pe-lōō′nȧ). The capital of the Province of Navarra in north Spain and in the Middle Ages capital of the Kingdom of Navarra. It is situated on an eminence dominating the surrounding plain among the foothills of the Pyrenees, 16 miles from the French frontier (Map: Spain, E 1). It is a military station of the first class and is surrounded by a circle of detached forts. The streets in the old quarters are narrow, while in the suburbs have sprung up many modern houses lining broad and well-kept streets. The city has three beautiful plazas, of which the Plaza del Castillo, with its arcades flanked by the edifice of the provincial deputation and the simple modern theatre, is the best, and four charming promenades, and the parklike forest of *La Taconera;* while among the principal buildings are the Gothic cathedral, begun in 1397, with a Græco-Roman façade, and the historic Sala Preciosa, where formerly met the Cortes of Navarra, the ornate municipal palace, the viceregal palace, and the bull ring, capable of seating 8000 persons. The aqueduct of Noain, 8 miles long, for a portion of its course supported by 97 arches, furnishes the city with its water supply. The town possesses also a large hospital, a provincial institute, normal schools, and a seminary. The chief manufactures are linen, flour, soaps, beverages, leather, and paper, and there are iron, lead, and copper foundries. Pop., 1900, 30,609; 1910, 29,472.

Its known history goes back to Pompey the Great, by whom it was rebuilt in 68 B.C. The name Pamplona is said to be derived from *Pompeiopolis* (the city of Pompeius), though this etymology is disputed. Being a fortified frontier town, Pamplona has figured in the Gothic, Frankish, Moorish, French, and Carlist wars. In Pamplona was born the celebrated violinist Pablo Sarasate (1844).

PAMUNKEY, pȧ-mŭṇ′kĭ. See POWHATAN CONFEDERACY.

PAN (Lat., from Gk. Πάν, perhaps connected with Lat. *pasci*, to feed, *pastor*, shepherd, Skt. *pā*, to protect). A Greek god of herds and hunters, pastures and forests. He seems to have been originally the god of shepherds and goatherds, while he is but slightly connected with neat cattle, which formed a very unimportant part of the wealth of the region where his cult grew up. This was especially the mountainous district of Arcadia, and the varied aspects of the god can be easily referred to the wandering life of the herdsmen, which led them from the lower pastures and valleys up to the high mountains and cooler regions in the summer. From this life also is derived Pan's connection with the hunt and fishing, as both are diversions of the herdsman's life. He seems to have passed into a war god with the growth of the mercenary service of the Arcadians, though from relatively early times we hear of the *Panic fear* which he inspired. This seems derived from the apparently causeless "stampedes" of herds, often hurrying them to destruction, and the observation that similar frenzy seemed to seize an army at times and drive it into mad rout. Pan is not mentioned in the epic, and his worship seems to have spread but gradually beyond Peloponnesus. It was introduced into Athens after the battle of Marathon, when Pan was believed to have fulfilled a promise to help the Athenians. A sanctuary in a cave on the northwest side of the Acropolis was then given to him, and many votive reliefs of Pan and the nymphs attest his popularity. He was also honored with annual sacrifices and a torch race. Owing to the character of his cult, the legends about Pan are largely local. He is called the son of Zeus and Callisto and twin brother of Arcas; son of Hermes and the daughter of Dryops, or Penelope; or by later mythographers, who connected the name with πᾶν (all), as the son of Penelope and all the suitors. A late Homeric hymn tells of his birth and how Hermes carried him to Olympus, where he delighted all the gods. Later philosophers, especially some of the Stoics, transformed this divinity into the great All-God, but this was never a general belief. Pan's appearance was described in accordance with his nature. Goat's legs and horns, a shaggy beard and hair, and goatlike features bespoke his origin, and this type is common in art, though associated from the middle of the fifth century B.C. with another, representing him as a youth, whose animal nature is marked only by short horns on the forehead. Hellenistic art also introduced female Pans and child Pans, though the Greek religion knew of but the one god. In art he became attached especially to Dionysus, perhaps on account of the satyrs. The artistic type of Pan seems also to have contributed to the development of the popular representations of the devil in the earlier Christian art. Consult: Walther Immerwahr, *Kulte et Mythen arkadiens*, vol. i (Leipzig, 1891); Victor Bérard, *De l'origine des cultes arcadiens* (Paris, 1894); the article "Pan," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. iii (Leipzig, 1897–1909); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte*, vol. ii (Munich, 1906).

PA′NA. A city in Christian Co., Ill., 44 miles northwest of Springfield, on the Illinois Central, the Baltimore and Ohio Southwestern, the Chicago and East Illinois, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads (Map: Illinois, F 7). The city contains the Huber Memorial Hospital, a public library, a high school, Y. M. C. A. building, and Kitchell Public Park. It carries on considerable trade in the farm products of the surrounding country, has a soda-fountain factory and wood-working plants, and is largely engaged in coal mining. Settled in 1853, Pana was incorporated by a special charter in 1867. The government is administered under a general law of 1870, which provides for a mayor, elected every two years, and a council. The city owns and operates the water works. Pop., 1900, 5530; 1910, 6055.

PANÆTIUS, pȧ-nē′shĭ-ŭs (Lat., from Gk. Παναίτιος, *Panaitios*) (c.185–c.112 B.C.). A Greek Stoic philosopher, born at Rhodes. He studied and taught in Athens, where Lælius became his pupil. He went to Rome and became one of the literary circle patronized by the younger Scipio, but it seems that he returned to Athens several years before his death. He belonged to the Middle (or eclectic) Stoa, borrowing much from Plato and Aristotle; and his great work on moral obligation was the basis of Cicero's *De Officiis*. Consult: Van Lynden, *De Panætio Rhodio* (Leyden, 1802); Fowler, *Panætii Fragmenta* (1885); R. D. Hicks, *Stoic and Epicurean* (New York, 1910); E. V. Arnold, *Roman Stoicism* (Cambridge, 1911); Ritter and Preller, *Historia Philosophiæ Græcæ* (9th ed., Gotha, 1913). See STOICS.

PANAMA, păn′ȧ-mä′. The capital of the Republic of Panama, situated at the head of the

Bay of Panama, on the south shore of the isthmus (Map: Central America, H 6). Though its streets are narrow, the town is well built. Since work on the canal was begun Americans have given the city modern sewage, water works, and paved streets. The older buildings include a large cathedral, a Jesuit college, and several convents. The Government·Palace, containing the Assembly Hall, the National Theatre, and public offices, and the Municipal Building have been constructed since the independence. There is also a National University, which was opened in 1911. The town is the Pacific terminus of the Panama Railway, and its prosperity has been due largely to the transit trade. Its harbor is shallow, and with the opening of the canal most of the trade will be carried on through the terminal port of Balboa, which was constructed by the Americans and has ample wharfage and other facilities. Pop., 1911, 37,505. Panama was founded in 1519 by Pedrarias Dávila, being the first town founded by Europeans on the American continent. During the seventeenth and eighteenth centuries it was the chief port for the Spanish trade in the Pacific. In 1671 it was destroyed by the English buccaneer, Henry Morgan, and was rebuilt on a new site, about 5 miles west of the original one. In the nineteenth century its commerce declined, but received a new impetus by the completion of the Panama Railroad in 1855. It has often suffered from civil wars, and in 1903 it was the scene of the revolution which achieved the independence of the Republic.

PANAMA. A Central American republic, situated between Costa Rica and Colombia (Map: Central America, H 6). It is bounded on the north by the Caribbean Sea and on the south by the Pacific Ocean. Its land boundaries, all of which are not yet definitely established, aggregate not more than 250 miles, while the length of its coast line is 1245 miles, of which 767 miles are on the Pacific side and 478 on the Caribbean. Its greatest length is about 430 miles. Its greatest breadth, about 118 miles, is between the mouth of the Escribanos River on the north and Punta Mariato on the south; its narrowest part, about 31 miles, is between the Gulf of San Blas on the north and the mouth of the Chepo River on the south. The average breadth is about 70 miles. On account of boundary disputes with Colombia and Costa Rica the area of Panama cannot be stated exactly. One estimate of the area is 87,480 square kilometers (33,776 square miles). The Costa Rican boundary has been a subject of controversy for over 80 years. Through the good offices of the United States government Costa Rica and Panama agreed in 1910 to submit the dispute to the arbitration of the Chief Justice of the United States Supreme Court. In the autumn of 1914 Chief Justice White rendered his decision, which was unfavorable to Panama, and the latter, it was reported in January, 1915, notified the American Department of State that it refused to accept the decision. The Panamanians contended that the Chief Justice went beyond the scope of the arbitration agreement, giving to Costa Rica more territory than it asked for. If the award of the Chief Justice finally becomes established in fact, the area stated above will be somewhat reduced. The Republic comprises 9 provinces, viz., Panama, Colón, Bocas del Toro, Coclé, Los Santos, Veraguas, Chiriquí, Herrera, and Azueros; the establishment of Herrera and Azueros as provinces was announced in 1915. For a description of the physical features of the Republic, see Panama, Isthmus of.

The Canal Zone, over which the United States has sovereign rights in virtue of the Treaty of Nov. 18, 1903, is a strip of territory extending to a width of 5 miles on either side of the middle of the Panama Canal, but excluding the cities of Panama and Colón. Its area is 474 square miles. It was announced in the spring of 1915 that the Canal Zone would thereafter be called officially Panama Canal.

Industries. The soil is fertile, and the vegetation is of tropical luxuriance, but only a small part of the country is under cultivation, and much of it is unoccupied. The most important and practically the only well-organized industry is the production and exportation of bananas from the Province of Bocas del Toro. In this district the United Fruit Company, an American corporation, has upward of 35,000 acres under banana culture; it exported, in 1911, 4,258,000 bunches, valued at $2,146,000. Other crops include coconuts, sugar cane, cacao, coffee, corn, rice, yams, sweet potatoes, tobacco, and ivory nuts. Coconuts are grown especially in the Province of Colón. The domestic supply of vegetables does not equal the demand, and quantities are imported from Jamaica and New Orleans. Some attention is given to the raising of live stock, but the industry is little developed; in 1905 there were about 65,000 cattle. The forests contain valuable hard woods, such as mahogany, cedar, cocobolo, rosewood; also dyewoods, resinous trees, and medicinal plants, such as copaiba, sarsaparilla, and ipecacuanha. Rubber trees grow naturally in the Cordillera, where the Indians collect the product, and have also been planted near the coast. Panama is believed to have large and varied metalliferous deposits, but they are little exploited and not even well known. In value of product gold is the most important metal obtained at present. The pearl fisheries among the Pearl Islands in the Gulf of Panama are famous. Turtle shells are also obtained in commercial quantities. Manufactures are insignificant. Chocolate, mineral waters, ice, and soap are made for local demand. The production of tobacco, cigars, cigarettes, and salt is a government monopoly, which is let to private persons.

Commerce and Communications. Panama's foreign trade is conspicuous for the preponderant share held by the United States and for the great excess of imports over exports. Imports (exclusive of nondutiable supplies for the Panama Canal) and exports have been valued as follows:

	1909	1910	1911	1912
Imports..	$8,756,308	$10,056,994	$9,896,988	$9,871,617
Exports..	1,502,475	1,769,330	2,863,425	2,064,648

In 1912 the largest classified imports were: vegetable products, $2,924,000; textiles, $1,666,000; animal products, $1,661,000; mineral products, $1,000,000; beverages, $473,000; drugs and chemicals, $420,000. The export of vegetable products (chiefly bananas) in 1911 was valued at $2,550,000 and in 1912 at $1,829,000; animal products (largely hides), $228,000 and $229,000;

mineral products (chiefly gold), $83,000 and $6000. After bananas the principal vegetable exports are ivory nuts, coconuts, and rubber. In 1911 exports to the value of $2,566,000 went to the United States and, in 1912, $1,780,000. In the latter year, the United States supplied 53.7 per cent of the imports, the United Kingdom 24.1 per cent, Germany 10.9 per cent, and France 2.8 per cent. The principal ports are Panama, Colón, and Bocas del Toro. The ports of Panama and Colón are in communication with European and American countries by several lines of steamers, and the port of Bocas del Toro is visited by steamers engaged in the banana trade. Panama has cable connections with North and South American ports, and Colón also with European ports. The Panama Railroad, 48 miles long, connects the city of Panama and Colón. It dates from 1855, but has been relocated, owing to the flooding of the Chagres River valley by the Gatun Dam, and practically rebuilt. It is owned by the United States government. There is a branch, 3 miles long, to the Balboa docks (Balboa is the port of the city of Panama). In 1914 construction was begun on a 51-mile railway in the Province of Chiriquí. In the region around Bocas del Toro light railways, chiefly for the banana industry, aggregate about 150 miles. In the interior of the Republic there are practically no carriage roads properly so called. Telegraph and post offices number about 40 and 100 respectively.

Finance. The monetary unit is the gold balboa, equivalent to the American gold dollar. The currency in actual use is silver; the peso, worth one-half balboa, and the half, fifth, tenth, and twentieth peso pieces are silver coins. The Republic received from the United States $10,000,000 for the cession of the Canal Zone and rights appertaining thereto; of this sum $6,000,000 were invested in the United States, and the remainder was applied to the establishment of a real-estate loan bank, public improvements, etc. Until 1915 there was no foreign debt; early in that year it was announced that the government had negotiated a loan of $3,000,000 at New York, the proceeds of which were to be used in railway construction. In 1911 revenue amounted to $3,366,470, and expenditure to $3,359,588. For the two-year fiscal period 1913 and 1914, the budget balanced at $7,682,428; the estimated customs revenue was $3,300,000.

Population. The population in 1911 was about 337,000, exclusive of the Canal Zone; the latter at the beginning of 1912 had about 62,800 inhabitants. In the Republic whites numbered 46,300 in 1911, mestizos 191,900, negroes 49,000, Indians 47,600, Mongolians 2300. At the same time Roman Catholics numbered 267,700, Protestants 26,800, Buddhists 2100, Jews 500, and pagans 39,100. The capital, Panama (q.v.), had, in 1911, 37,505 inhabitants; Colón (q.v.), 17,748; David, 15,079; Bocas del Toro, 9759. As reported for 1912, the public schools of the Republic numbered 364, with about 14,500 pupils.

Government. The constitution bears date of Feb. 13, 1904. The executive authority is vested in a President, elected for four years by direct vote and ineligible for the succeeding term. There are three *designados* to succeed, in order, to the presidency in case of vacancy; they are elected by the National Assembly. This body, which exercises the legislative power, is unicameral and consists of 32 members, elected directly. The President has a cabinet of five members. Each of the provinces is administered by a Governor appointed by the President.

History. The Caribbean coast of Panama was first explored by Columbus in 1502. In 1509 the isthmus was included in the grant to Diego de Nicuesa. In 1513 Balboa discovered the Pacific Ocean, which he named the South Sea. Even in the early colonial period Panama was of great importance, owing to the fact that the entire trade with the west coast of America passed over the isthmus, from Portobello to Panama. The rule of Spain came to an end in 1821, and Panama joined the Republic of Colombia. But the union was never very firm, partly owing to difficulties of land communication, but mainly because of the special interests of Panama as an interoceanic trade route. In 1831, when the old Republic of Colombia was split up into the republics of Venezuela, Ecuador, and New Granada, Panama became a part of the latter. In 1840 Panama revolted and, together with the Province of Veraguas, attempted to form an independent republic, but failed. In 1846 the United States obtained from New Granada the right to guard the trade route and preserve the neutrality of the isthmus. In 1855 the Congress of New Granada created the autonomous State of Panama out of the provinces on the isthmus. In 1885 the old conditions of direct government from Bogotá were restored by a revolution, in the course of which United States marines were landed for the protection of the international trade route. From 1846 to 1903, 53 revolutionary outbreaks occurred on the isthmus. On November 3 of the latter year a bloodless revolt achieved the independence of the Republic. (For the events leading up to the declaration of independence of Nov. 4, 1903, as well as for an account of the relations between the United States and the new Republic, see PANAMA CANAL.) A constitutional convention met on Jan. 15, 1904, and drew up a constitution modeled on those of the United States and Cuba, which was published on February 15. Manuel Amador Guerrero was chosen first President. Since the independence Panama has enjoyed peace and prosperity, resulting largely from its proximity to the Canal Zone. Difficulties occurred in the presidential canvass of 1908, and there were many charges of fraud, but these were adjusted, and the election passed off quietly. The successful candidate, Domingo de Obaldía, died in 1910, and Pablo Arosemena was chosen to serve the unexpired term. In 1912 Belisario Porras, a Liberal, became President. Measures taken to solve the problem of naturalized and alien residents caused much trouble in 1914 with the Chinese, who at first refused to pay the registration tax. In this same year a law was passed forbidding foreigners to mix in politics and empowering the President to expel any naturalized citizen who should attack public authorities or institutions through the press or by other means.

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PANAMA, ISTHMUS OF. A narrow strip of land extending between the southern end of the active volcanic region of Central America and the northern termination of the Andes (Map: Central America, H 6). It stretches from east to west in the form of an S, between the meridians of long. 77° 15′ and 83° 10′ W., a distance of about 415 miles. Its average width is nearly 70 miles, which is reduced to 31 miles between the bays of Panama and San Blas. It is bounded on the north by the Caribbean Sea, on the east by Colombia, on the south by the Pacific Ocean, and on the west by Costa Rica. Area, 32,280 square miles.

Topography. There is no well-defined coastal plain, though occasional stretches of beach, as at Panama, are exposed at low tide, but their continuity is interrupted by abrupt cliffs and mountains fronting on the sea. The surface of the greater part of the country consists of low mountains and hills covered with dense forests. These elevations are not arranged in systematic chains or ridges, but are very irregularly distributed. Only in the extreme west and in the neighborhood of San Blas are there mountains of systematic arrangement. With these exceptions the topography consists of hills from 200 to 1500 feet in height, separated by drainage valleys that are cut down almost to sea level. There are, however, a few small areas of nearly level treeless upland, as from the mouth of the Bayano River to the Costa Rican boundary on the Pacific side. The region assumes the character of lofty mountains in its western section, where also are found a number of towering and seemingly extinct volcanoes (Chiriquí, Pico Blanco, both over 11,000 feet in height). Panama possesses three natural passes, which afford easy routes between the two seas, viz., San Blas (1142 feet), Caldonia (1003), and Culebra (287). The latter was chosen for the construction of the Panama Canal (q.v.).

Hydrography. There is no well-defined water parting. The drainage is about equally divided between the two oceans. The streams are of great age, and the larger rivers, receiving the waters of many branches, usually reach sea level so far inland that they become tidal rivers, sometimes at a distance nearly halfway across the isthmus. The Tuyra drains most of the country between the boundary with Colombia and the Gulf of Panama and empties into the Pacific. This is the largest drainage basin of the isthmus. Farther westward the Bayano, with many tributaries, drains the central part of the isthmus. It is succeeded farther west by the drainage of the Chagres Basin, which flows into the Caribbean, though the basin extends nearly to the Pacific. The waters of the Chagres have been controlled to furnish a supply for the locks of the Panama Canal. From the Chagres to the Costa Rican border the drainage consists of less complicated streams rising nearer the axial line and flowing into either ocean.

Climate. The mean annual temperature, 78° F. to 80° F., is somewhat higher on the Atlantic coast, owing to the warmer waters of the Caribbean. The extreme annual range of temperature rarely exceeds 30°, the limits being 65° and 95° or 100°. The entire region is under the influence of the northeast trades between December and April, and in the remainder of the year these air currents are replaced by southeasterly winds. The rainfall is very heavy, and the climate is unhealthful, except where modern sanitation, introduced in the course of the construction of the canal, has removed the causes of many tropical diseases.

Flora and Fauna. The whole region is covered with a jungle of grasses, sedges, wild plantains, and trees characteristic of the lower lands of the Caribbean. Owing to less copious rainfall, vegetation is less exuberant on the Pacific than on the Atlantic side. The oceanic fauna on the Caribbean side differs greatly from that on the Pacific side, and even the land animals differ in the same way to some extent.

Geology. The general level of the isthmus has been enormously lowered by long-continued erosion. The surface is rapidly approaching base level. Antiquity is stamped upon every form. The igneous rocks are now exposed by erosion. But the volcanic fires which still persist eastward in the Andes and westward in Central America have long ceased to exist in the isthmus. There is no evidence that the oceans have ever communicated across the isthmian regions since Tertiary times. If the isthmus could be lowered 300 feet at present, the waters of the two oceans would commingle through the low Culebra Pass.

Consult: Elisée Reclus, *The Earth and its Inhabitants, North America*, vol. ii (New York, 1893); Hill, "The Geological History of the Isthmus of Panama and Portions of Costa Rica," *Bulletin of Museum of Comparative Zoölogy at Harvard University*, vol. xxviii, no. 5 (Cambridge, 1903); Lionel Wafer, *New Voyage and Description of the Isthmus of America*, reprinted from original edition of 1699, edited by G. P. Winship (Cleveland, 1903); R. M. Valdés, *Geografía del istmo de Panama* (New York, 1905).

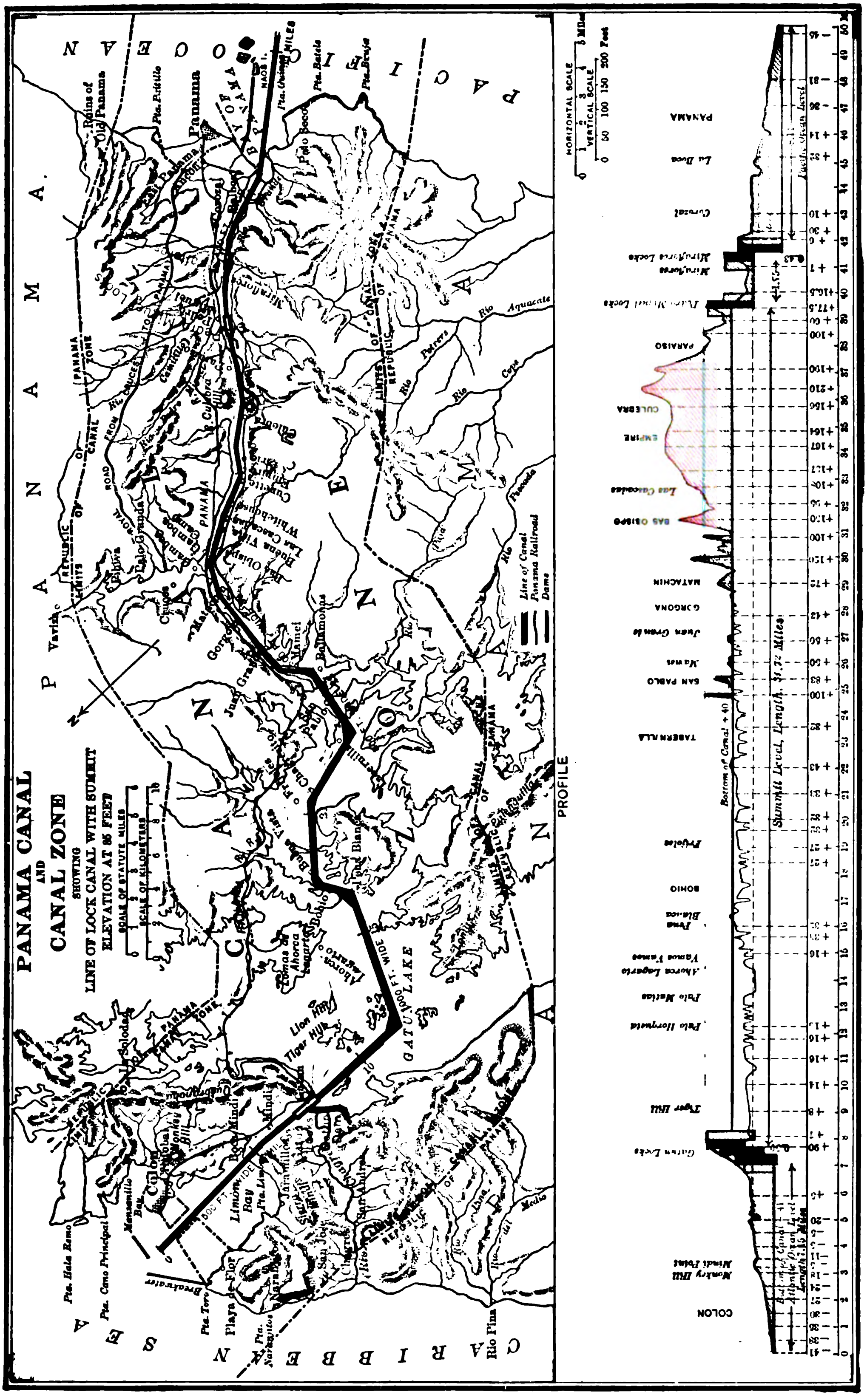
PANAMA-CALIFORNIA EXPOSITION. An international exposition held in San Diego, Cal., from Jan. 1 to Dec. 31, 1915. This exposition to celebrate the completion of the Panama Canal came into formal existence in 1911 by the organization of a corporation of which U. S. Grant, Jr., was made president, L. G. Monroe secretary, and D. C. Collier director general, which raised a fund of over $2,250,000. A site occupying an area of 618 acres was selected in Balboa Park, a public playground that bordered on the business centre of San Diego, and construction work was begun on July 19, 1911. The exposition grounds were entered over Puente del Cabrillo, a bridge 135 feet high and 900 feet long, that crossed a deep canyon and served as an approach to the walled city, in which the buildings were in the Spanish Colonial style of architecture, suggesting the Alhambra, the old Mexican cathedrals, and the older homes of the Moors. Towers and minarets, white walls and red-tiled roofs, rose through a profusion of plants, shrubs, palms, and flowers. On passing through the entrance arches the California State Building, with its massive cathedral-like dome and tower, commanded attention, while opposite was a Roman building in which were shown the exhibits of ethnology and archæology. Eight other buildings, each a replica of some historic palace of Spain or Spanish America, with rounded arches and connecting colonnades, came next on the tree-lined Prado. These were devoted to the exhibits pertaining to home economy, arts and crafts, science and education, foreign arts, botany, commerce and industry, varied industries and food products. In addition to the foregoing there were special buildings in which were shown the exhibits of Sacramento valley, San Diego County, San Joaquin valley, and southern California counties, as well as the buildings from the following States: Arizona, Colorado, Kansas, Ohio, Nevada, New Mexico, Utah, and Washington, and one for the exhibits from Brazil. The amusement features were grouped along a narrow street called the Isthmus, on which there were 60 buildings. Beyond these, in the extreme northeastern end of the grounds, was the Painted Desert, a reservation of 6 acres surrounded by an adobe wall and cedar stockade. The space inside consisted of an open plain divided by a high mesa on which were cliff dwellings, while in the foreground were the homes of the Pueblo Indians, and in the background were those of the wandering tribes. The entire rock formation was colored like the real Painted Desert in Arizona. The industries of the Southwestern aborigines, including pottery making, blanket weaving, making of silver ornaments, and other home occupations of the Indians, were shown in active operation. The principal exhibits in this exposition were those pertaining to the archæology, ethnology, and natural history (especially botany) of the southwestern part of the United States.

PANAMA CANAL. The ship canal across the Isthmus of Panama, connecting the Atlantic and Pacific oceans. The project for a canal across the Isthmus of Panama is nearly or quite 400 years old. Balboa and other early Spanish explorers first broached the matter to the Emperor of Spain in the early years of the sixteenth century and made surveys in the search of a feasible line for a canal across the Panama Isthmus between 1515 and 1525, Charles V having been particularly interested in these early efforts. All of them, however, ultimately failed, but the project was kept alive from one period to another until interest in it in the United States began to be more or less active after the last of the Central and South American provinces of Spain established its independence in 1823. Henry Clay and Andrew Jackson, both as representatives of the United States government, manifested keen interest in the consideration of this waterway, but there appeared to be no widespread public concern regarding it until after the Mexican War was closed, in 1848, followed by the cession of Texas and California by Mexico to the United States. The acquisition of this great Western territory practically created the Pacific coast of the United States, and from that time on national interest in the construction of a ship canal across the isthmus has been constantly increasing because of the necessity, almost imperative, of bringing the two ocean coasts into the closest possible communication with each other.

The first project for the construction of such a canal to result in the actual beginning of the work grew out of a concession granted by the government of Colombia to Lieut. Lucien N. B. Wyse and others in May, 1878, giving to them the exclusive privilege, for 99 years, of constructing and operating a canal across the territory of the Republic between the Atlantic and Pacific oceans. An international congress of 135 delegates, mostly engineers, 11 being from the United States, was held at Paris in May, 1879, under the auspices of Ferdinand de Lesseps (q.v.), who had been induced to assume the leadership in the undertaking, and after a session of two weeks decided that the route for the canal should be across the Isthmus of Panama, between the cities of Colón and Panama, and that the canal should be a sea-level one and without locks.

Panama Canal Company. For the purpose of construction the Panama Canal Company, officially known as the Compagnie Universelle du Canal Inter-océanique de Panama, was organized under the laws of France, with Lesseps as president. It purchased the Wyse concession for 10,000,000 francs and at once entered upon the task of surveying the route and doing other preliminary work. The plan adopted provided for a sea-level canal 29.5 feet in depth, with a bottom width of 72 feet, and about 47 miles long, involving an excavation of 157,000,000 cubic yards of earth and rock. The estimated cost of construction, as calculated by Lesseps, was $127,600,000, and the time required was estimated at eight years, both of which estimates were considerably under those made by the International Congress.

Preliminary work was begun in 1881, but operations on a large scale began only in the early part of 1883. After a comparatively short period of excavation and other construction work it became evident that the undertaking involved difficulties which had not been foreseen and that the estimates were absurdly low. In order to obtain additional funds and to retain the confidence of the French public, irregular and corrupt proceedings on an almost unprecedented scale were resorted to, prominent newspapers were subsidized, and a number of members of the French Chamber of Deputies were corrupted. In 1889 the financial difficulties attending the enterprise became so great that work could no longer be carried on, and the company was dissolved by a judgment of the Tribunal Civil de la Seine in February of that year. The company was declared to be bankrupt, and it was found, on examination, that up to this time 1,300,000,000 francs had been expended, that the assets of the company amounted to only 700,000,000 francs, and that only a small part of the work had been done. Upon the dissolution of the company by the court a liquidator was appointed to take charge of its affairs. The liquidator was authorized to cede to any new company all or a part of the assets and to borrow money and make contracts with a view to completing the work of construction. He appointed a commission d'études of 11 French and foreign engineers, who reported (1890) in favor of the feasibility of the project and submitted a plan with locks estimated to cost about $175,000,000 including administration and financing. The liquidator asked for and received from the government of Colombia three successive extensions of time within which the canal was to be completed and put into operation. The last extension gave the promoters until 1910 to complete the work. In October, 1894, the new Panama Company was organized with a capital stock of 650,000 shares of 100 francs each, 50,000 of which were given to the Colombian government for the extension of time granted in 1890, leaving 60,000,000 francs ($11,640,000) as cash capital. The old company and the liquidator had thus raised about $246,700,000 with the results of 72,000,000 cubic yards of excavation and $29,000,000 of plant at the isthmus.


PANAMA CANAL AND CANAL ZONE
SHOWING
LINE OF LOCK CANAL WITH SUMMIT ELEVATION AT 85 FEET
SCALE OF STATUTE MILES
SCALE OF KILOMETERS
Line of Canal
Panama Railroad
Dams
PANAMA
CARIBBEAN SEA
PACIFIC OCEAN
CANAL ZONE
GATUN LAKE
1000 FT. WIDE
Colon
Limon Bay
Manzanillo Bay
Breakwater
Gatun
Tiger Hill
Lion Hill
Ahorca Lagarto
Bohio
Buena Vista
Frijoles
Tabernilla
San Pablo
Mamei
Gorgona
Matachin
Bas Obispo
Las Cascadas
Empire
Culebra
Paraiso
Pedro Miguel
Miraflores
Corozal
La Boca
Balboa
Naos I.
Panama
Ruins of Old Panama
Rio Chagres
Rio Aguacate
Rio Cocoli
Rio Grande
LIMITS OF CANAL ZONE
REPUBLIC OF PANAMA
Pta. Toro
Playa de Flor
Rio Pina
HORIZONTAL SCALE 0 1 2 3 4 5 Miles
VERTICAL SCALE 0 50 100 150 200 Feet
PROFILE
COLON
Gatun Locks
Bottom of Canal +40
Summit Level, Length 31.72 Miles
Pedro Miguel Locks
Miraflores Locks
PANAMA
Pacific Ocean Level
Atlantic Ocean Level

The property and assets of the old Panama Company were now transferred to the new Panama Company. The new company was required by its charter to appoint with the liquidator an engineering commission of five members to report upon work done and upon conclusions when half the amount of capital should be expended. An international technical committee, composed of 14 eminent engineers, representing the United States, Great Britain, Germany, and France, was also appointed to investigate the project and in November, 1898, reported unanimously in favor of the feasibility and practicability of completing the canal. They reported that the canal was already two-fifths completed, that not more than $102,400,000 would be needed to finish the work, and that the time need not exceed 10 years. This report was referred to the statutory engineering commission of the new company, who reported in 1899, confirming the conclusions of the International Technical Committee. The work of construction was then resumed on a small scale. Up to June 30, 1899, the new company had expended about $8,000,000 and had excavated about 5,000,000 cubic yards of earth.

Relative Advantages of Nicaragua and Panama. In 1899 President McKinley was authorized to appoint a commission of eminent engineers and other persons to investigate the whole question of canal possibilities on the isthmus from Nicaragua to Colombia. After an exhaustive investigation the commission reported in favor of the Nicaragua route, chiefly in consequence of the difficulties met in the efforts to negotiate satisfactorily with the officials of the new company. This led to an immediate change of officers of the new Panama Canal Company. and upon the offer of the latter to sell its property and franchises to the United States for $40,000,000, its value as estimated by the commission, the commission made a supplementary report advocating the acceptance of the offer and the completion of the unfinished canal by way of Panama. In Congress discussion of the respective advantages of the Panama and Nicaragua routes was long and earnest, finally ending in June, 1902, by the enactment of a law authorizing the President of the United States to purchase the property and franchises of the Panama Canal Company for $40,000,000, provided a satisfactory title could be secured, and further authorizing the Secretary of War in that event to construct the canal at a cost not to exceed $145,000,000.

Negotiations with Colombia. Negotiations were at once entered upon with the Republic of Colombia to secure the necessary concessions, and a thorough investigation was begun to ascertain the character of the legal title of the Panama Company to the property which it proposed to sell. Upon investigation it was found that the company had a valid title, and on Feb. 16, 1903, the government of the United States formally accepted the offer of the company to sell its rights and property for $40,000,000, subject to the ratification of the treaty with Colombia then pending before the Senate. This treaty had been concluded after a long negotiation between the two governments, lasting through a period of six months, the delay being caused by disagreement of the two governments as to the price to be paid for the concession. In January, 1903, the treaty was laid before the Senate for ratification, but on account of opposition of a few Senators, under the leadership of Morgan of Alabama, who favored the Nicaragua route, the Fifty-seventh Congress closed without action on it. An extra session of the Senate was called to meet on March 5, and after two weeks of debate the treaty was ratified on March 18 by a vote of 73 to 5. The treaty provided that the United States should pay to the Republic of Colombia the sum of $10,000,000 in gold in cash for the concessions, to be paid upon the exchange of ratifications, and an annuity of $250,000, beginning nine years after the date of ratification, the latter sum being a compromise between the $600,000 demanded by Colombia and the $100,000 offered by the United States. The concession authorized the new Panama Company to transfer to the United States all its property and franchises, including the Panama Railroad. The lease was to be for 100 years, with the privilege of perpetual renewal.

The treaty further provided that the territory comprising the Canal Zone should be neutral and under the guaranty of both governments. If it should become necessary at any time to employ armed forces to maintain the safety of the canal or insure its public use, the Republic of Colombia agreed to provide the necessary troops. Provision was made for a joint American and Colombian commission to establish and enforce sanitary and police regulations. Colombia agreed not to cede or lease any territory to any foreign power within certain limits for coaling stations, fortifications, etc., that might interfere with the construction, protection, safety, and free use of the canal, and the United States agreed to support Colombia in preventing the occupation of any such territory. Panama and Colón were to be free ports for vessels and goods intended to pass through the canal, which, it was agreed, should be open for traffic within 14 years, unless the United States should determine to make the canal a sea-level enterprise, in which event the time was to be extended 10 years longer. Already by the Hay-Pauncefote Treaty of November, 1901, superseding the Clayton-Bulwer Treaty (q.v.), the sole right of the United States to construct, maintain, and police the canal was conceded by Great Britain, which power at the same time withdrew its claim to a joint guaranty of the neutrality of the canal upon the agreement of the United States to accept substantially the rules governing the free navigation of the Suez Canal. See HAY-PAUNCEFOTE TREATY and *Canal Toll Rates* below.

On June 20, 1903, the Colombian Senate assembled in extraordinary session for the purpose of considering the treaty. After prolonged discussion action on the treaty was postponed, on account of opposition in the Colombian Senate to the provision placing the canal strip under the joint guaranty of the United States and of Colombia, which appeared to be an abdication of sovereignty by Colombia and therefore unconstitutional. A further cause of opposition was the belief that the price stipulated in the treaty was too low, and that the French Panama Canal Company should not be allowed to cede its concession without giving some compensation to Colombia for the privilege. In October, 1903, the Colombian Secretary of State attempted to reopen negotiations at Washington, proposing a new treaty providing for greater compensation and explicit recognition of the sovereignty of Colombia in the territory traversed by the canal;

but his proposals were not considered by the American government.

Republic of Panama. The failure of the treaty created great dissatisfaction in Panama and on Nov. 4, 1903, Panama declared itself an independent republic. Under a treaty between the United States and Colombia, signed in 1846, the United States was empowered to maintain free and uninterrupted transit across the isthmus. Acting upon the rights guaranteed in this treaty, President Roosevelt directed the commanders of the warships *Nashville* and *Marblehead,* stationed at Colón and Acapulco, to prevent the landing of Colombian troops for the purpose of putting down the revolution. The action of Americans in charge of the Panama Railroad, in refusing to transport armed Colombian soldiers, further embarrassed the efforts of the Colombian government to maintain its territorial integrity. The new Republic was on November 13 formally recognized by the United States, and M. Bunau-Varilla was received as Minister.

Treaty of the United States with Panama. A treaty with the new Republic was concluded Nov. 18, 1903. Under this treaty, which was ratified on Feb. 23, 1904, the United States guarantees the independence of the Republic of Panama. The Republic of Panama grants to the United States in perpetuity the use, occupation, and control of a zone of land 10 miles in width, extending 5 miles on either side from the centre of the canal, with the proviso, however, that the cities of Panama and Colón are not within the grant. Within the Canal Zone the Republic of Panama grants to the United States all the powers which the United States would exercise if it were the sovereign of the territory. The cities of Panama and Colón are to comply in perpetuity with the sanitary ordinances prescribed by the United States, and in case the Republic of Panama is unable to enforce such ordinances, the United States is granted the right and authority to enforce them. Similarly, the United States is given the right to maintain public order in the cities of Panama and Colón and the adjacent territories if the Republic of Panama, in the judgment of the United States, is unable to maintain such order. The ports at either entrance to the canal and the towns of Panama and Colón are made free for all time, so that there shall not be imposed or collected customhouse tolls, tonnage, anchorage, lighthouse, wharf, pilot, or quarantine dues, upon any vessel using or passing through the canal or employed in connection with the construction or operation of the canal, excepting tolls and charges imposed by the Republic of Panama upon merchandise destined for consumption in other parts of the Republic of Panama, and upon vessels touching at the ports of Panama and not going through the canal.

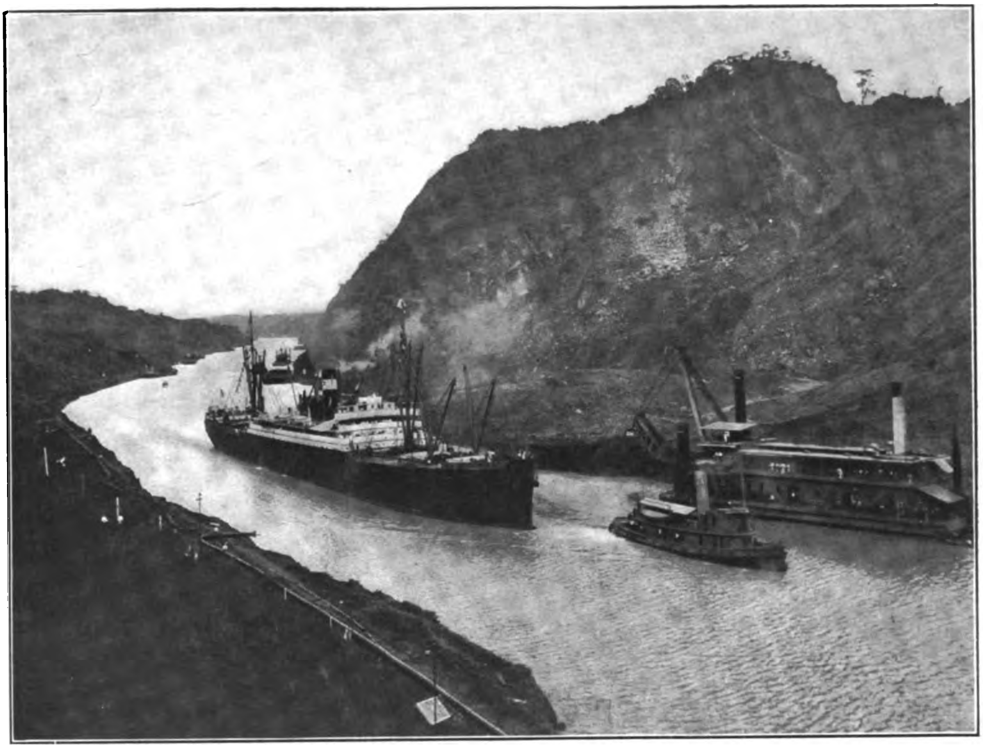
The compensation granted to Panama for the concession was $10,000,000 in gold coin on the exchange of ratifications, and $250,000 annually, beginning nine years after the exchange of ratifications.

After the secession of Panama (see PANAMA, republic; COLOMBIA, *History*), Colombia sent as special ambassador to the United States Gen. Rafael Reyes, for the purpose of securing the consent of the United States to the reannexation of Panama to Colombia. The negotiator announced the readiness of Colombia to ratify the treaty negotiated in 1903 or to make even more liberal terms. The United States government, however, refused to consider the proposals. An attempt was later made by Colombia to induce Panama to assume a certain proportion of the debt of Colombia, on the ground that such debt had been incurred in behalf of the citizens of the former Province of Panama as well as of those of other provinces. This attempt also proved unsuccessful.

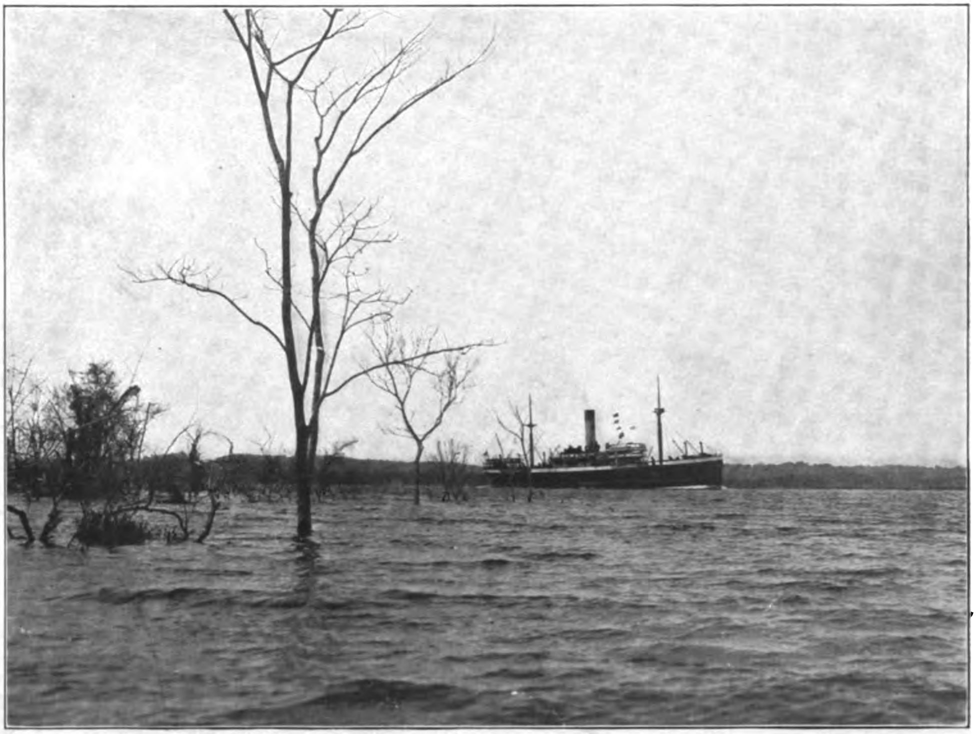
First Panama Commission. Pursuant to the terms of the treaty with Panama the United States government proceeded with negotiations for the transfer of the title of the French Panama Canal Company. The transfer was effected in May, 1904. In the meantime a commission of seven members charged with the duty of constructing the canal was appointed by President Roosevelt and confirmed by the Senate March 3, 1904. The chairman of this commission was Rear Admiral John G. Walker, U.S.N., Retired. The commission held its first meeting on March 22 and sailed for the Isthmus of Panama on March 29 to take the preliminary steps for a complete organization of all operations directly connected with or aiding the construction of the canal. For the prompt and effective discharge of its duties the commission at once organized its members into six committees—an executive committee, and committees on engineering plans, on engineering, on finance, on legislation, and on sanitation. The commission recognized the decisive importance of placing the Canal Zone in perfect sanitary condition. Previous experience, both in building the Panama Railroad and that gained by the old French Panama Canal Company between 1883 and 1889, had shown conclusively the imperative necessity of making the first step in the construction of the canal the adoption of effective sanitary measures affording protection to the working forces against both yellow fever and malaria.

Sanitation. When the commission went to the isthmus, therefore, about three weeks after their appointment, they took with them Dr. W. C. Gorgas, Colonel, Medical Department, U.S.A., as Chief Sanitary Officer; Dr. John W. Ross, U.S.N., Director of Hospitals; Dr. H. R. Carter of the United States Health and Marine Hospital Service, Chief Quarantine Officer, all of them selected for their extensive experience with yellow fever, especially in the case of Colonel Gorgas, in organizing and administering the sanitary measures which freed Havana from yellow fever after the American occupation. Colonel Gorgas remained Chief Sanitary Officer throughout the entire work of construction of the canal. This experienced sanitary and medical staff, increased immediately after the commission's visit to the isthmus by the appointment of Dr. Louis A. LaGarde, U.S.A., Dr. L. W. Spratling, U.S.N., Dr. Lewis Balch, and Joseph Le Prince, the latter also remaining throughout the entire period of construction, took charge of the entire sanitary and hospital work, including the large hospitals at Ancon and Colón, the complete quarantine organization, at Panama and Colón, the public-health work along the entire line of the canal, embracing the fumigation of buildings and the elimination of mosquitoes.

Recognizing the marked advance in hygienic sanitary knowledge since the time of the French operations, the commission decided to make the zone as healthy as possible, and thus for nearly

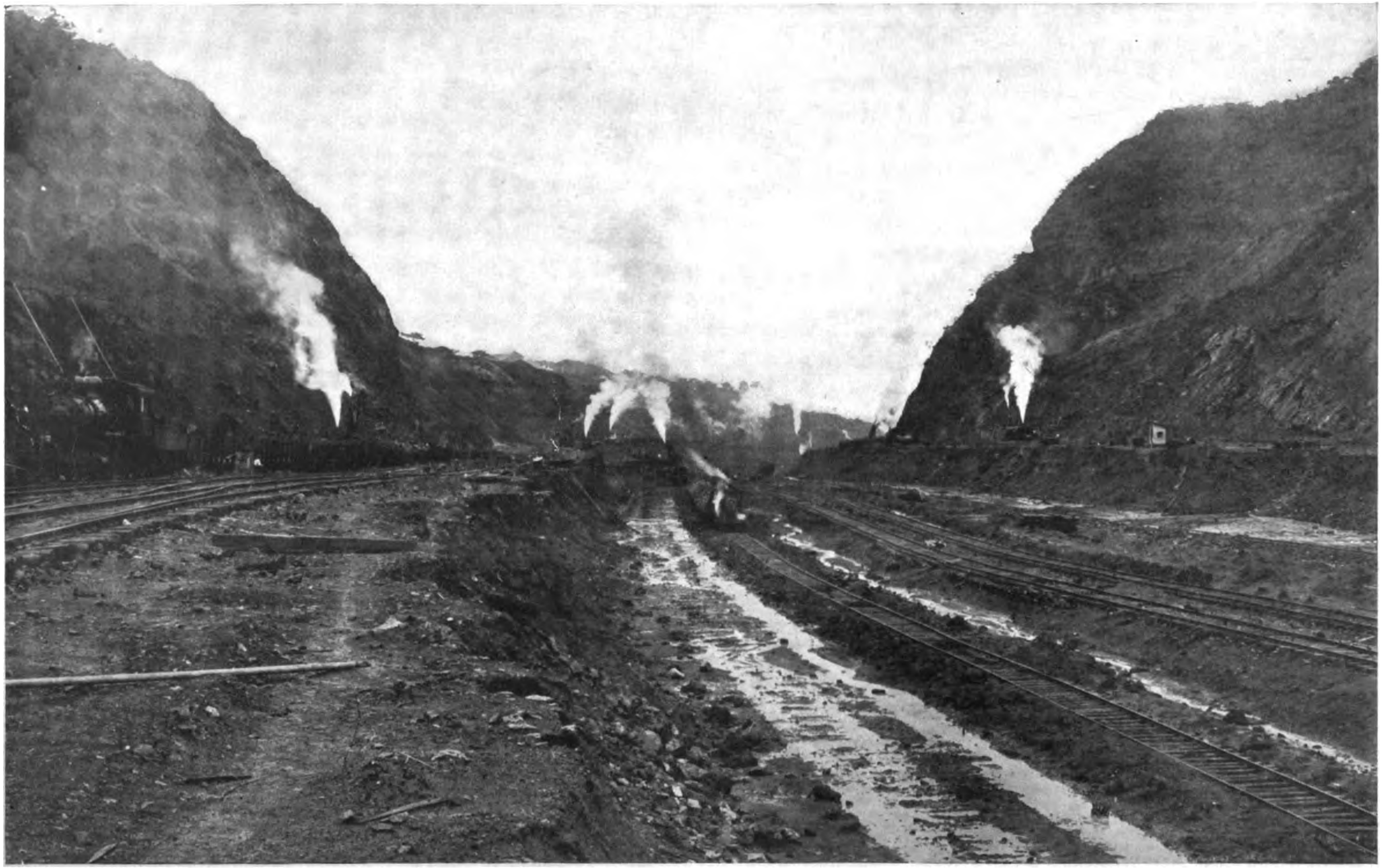


CULEBRA CUT LOOKING NORTH. A STEAMSHIP PASSING CUCARACHA SLIDE



STEAMSHIP PASSING SOUTH THROUGH GATUN LAKE NEAR FRIJOLES

PANAMA CANAL



PANAMA CANAL CONSTRUCTION

CULEBRA (GAILLARD) CUT LOOKING NORTH BETWEEN CONTRACTORS' HILL AND GOLD HILL, JUNE, 1911 two years the principal work was preparatory. Three diseases had to be taken into special consideration—plague, yellow fever, and malaria. The first step was to create a strict quarantine for all ships arriving from ports in which yellow fever was endemic. These ships were fumigated, mostly by the burning of sulphur, and crew and passengers were carefully examined and kept under observation. The next was to eradicate the epidemics and their sources. To prevent plague, rats and fleas had to be exterminated and docks and houses made rat proof. This plague appeared only once in the zone (1905).

To stamp out yellow fever and malaria an incessant war had to be carried on against the mosquito. Houses, tents, and buildings were fumigated and screened; malaria and yellow-fever patients were isolated; cities, villages, and farms were cleansed; garbage was collected, streets were paved, sewerage systems were installed, all fresh-water receptacles were covered, and a hygienic water supply brought into the cities. To kill the mosquito, pupa and larva, swamps and pools were drained and ditches dug, and covered with an oil called larvacide, consisting of a mixture of carbolic acid, resin, and alkali. Swamps were later filled up with dredged material from the canal. The carrier of yellow fever, the *Stegomyia*, is not so hardy as the *Anopheles*, the carrier of malaria. Thus it happened that yellow fever soon disappeared. After a severe epidemic in 1905 the last case of yellow fever occurred in the city of Panama in November, 1905, and in Colón in May, 1906.

Of malaria, Colonel Gorgas gives the following report: "Of all employees there were admitted to the hospitals as malaria patients, in 1906, 82.1 per cent; in 1907, 42.6 per cent; in 1908, 28.2 per cent; in 1909, 21.5 per cent; in 1910, 18.7 per cent; in 1911, 18.4 per cent; in 1912, 11 per cent; and in 1913, 7.6 per cent."

Special attention was also paid to leprosy, and a colony founded, which contained in 1913 about 50 lepers, with one male and one female nurse, one teacher for children, and five employees, Dr. H. R. Carter acting as physician.

To take care of the sick the hospital capacity consisted of 2500 beds. The two large hospitals —the Ancon Hospital at Panama and the Colón Hospital at Colón—were taken over from the French, equipped with all modern appliances, and used as base hospitals. The zone was divided into districts and 60 receiving hospitals erected, equipped with ambulance corps. In October, 1913, there were in the hospitals 329 white employees, 445 negro employees, 199 white nonemployees (pay patients), and 456 black nonemployees (pay patients). The income of the hospitals in 1913 from pay patients was $250,000.

During the first year of the French work (1881) there were 928 employees per diem, with 63 per cent sick and 6.7 per cent deaths. Colonel Gorgas (*Sanitation in Panama*, New York, 1915) remarks that these figures are much too low; as the French contractors had to pay for each patient $1 a day, day laborers were immediately discharged upon reporting sick. During the first year of the United States work (1904) there were 9000 men employed, with 40.1 per cent sick and a mortality of 1.46 per cent. The average death rate during the 10 years of digging was 1.7 per cent for each year; that is, out of a force of 39,000 men 663 died each year, or 6630 in 10 years. Taking the French average of mortality, this would give us 7800 men dying each year, or 78,000 in 10 years. The death rate for 1910 for New York City was 2 per cent; Philadelphia, 2.1 per cent; Washington, 2.2 per cent; Canal Zone, 1.7 per cent.

Organization of the Work. These necessary adjuncts to the construction operations proper of the canal were pushed vigorously to successful completion and aided much to produce the subsequent healthfulness of the Canal Zone. At the same time the commission proceeded to the immediate development of the requisite engineering forces whose services were urgently required preliminary to the inception of the construction work. John F. Wallace was appointed chief engineer and took charge of all construction operations on the isthmus in June, 1904. From that time on, engineering work, including excavation and other necessary general construction, was vigorously prosecuted. It became at once essential to decide upon the type of plant required for the work contemplated. The old French Company had used such machines and appliances as were available at that time and which have proved to have been reasonably effective for their purposes.

Plant and Equipment. An enormous amount of materials and all kinds of plant to the original value of $29,000,000 were turned over by the new Panama Canal Company to the United States government, and so far as they were available were adapted to the beginning of the American construction. Such parts as were suited to the current work on the canal were adapted from time to time to use. The commission decided to adopt the American steam shovel (q.v.) as the principal unit for dry excavation along the line of the canal and a type of dredge which proved itself to be thoroughly effective for under-water excavation. (For description and illustration, see DREDGE.) A large number of steam shovels were ordered by the commission at the outset of the work, and within a few months a number reached the isthmus and began the work of excavation in the great Culebra or Gaillard Cut. At the same time general plans were developed by the engineering organization for the handling of the excavated material by means of a proper adaptation of the Panama Railroad, for which a large additional amount of track was projected and arrangement made for the purchase of additional rolling stock. A department of purchases and supplies was also created in connection with the engineering organization, through which the great mass of material required for canal operations was purchased and delivered at the isthmus. Subsequently large constructions of docks, piers, and other plant required at the two termini of a canal line became necessary.

Thus, within less than six months after the creation of the commission, the great work of building the Panama Canal was fully launched and in successful progress, including probably the most effective sanitary administration ever known in connection with a tropical locality thoroughly infected with malaria and so stricken with yellow fever as to make it almost impossible for even a small number of immunes to remain there without attack for any substantial length of time. These departments of what may be called the construction organization were continued and developed so successfully that after a period of about nine years the Panama Canal became an essentially completed work.

It would be impossible to organize the inception of such a great work in an undeveloped tropical country separated by a wide stretch of ocean from materials, plant, and supplies, involving the ultimate employment of about 35,000 men, without some incidental mistakes. Such experiences, particularly under the conditions existing on the isthmus at the beginning of the American occupation, were inevitable, but they were quickly and effectively corrected.

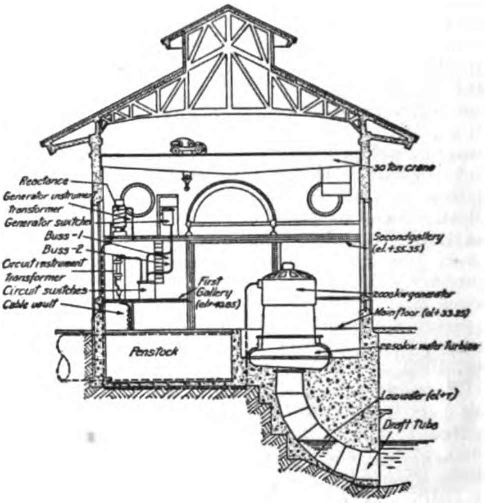
Civil Government. In addition to the main engineering organization, the sanitary and quarantine installations and necessary public works, such as water supply and sewers for Panama and Colón, it was the commission's duty to create and administer a civil government for the Canal Zone, exclusive, however, of the cities of Panama and Colón, which, while within the limits of the Canal Zone, were still integral parts of the Republic of Panama, and they were governed accordingly. This governmental organization was completed by the commission within about six months after its appointment by the enactment of a Code of Laws under which the Canal Zone has since been governed. Under this Code of Laws the judiciary of the Canal Zone was established and administered, the first appointment of judges being formally made. At the same time provision was made for the creation of a school system which has since been under most successful operation. A complete and effective police system was also organized and put into service by the commission, and it performed creditable duty from its inception. Under this Code of Laws the zone was divided into five municipalities. The system of government contemplated under the 16 enactments of the commission was created only after a careful examination of the laws of the Republic of Panama, so as to make the introduction of the Code as nearly as possible comply with existing procedures and at the same time secure effectively the necessary ends.

Early Progress. This first six months' work of the commission was fundamentally constructive and of a pioneer character with little or no precedent, and requiring to be done only after the most careful and thorough investigation of all the conditions found, few or none of which aided the accomplishment of the desired results. At the end of the first year, however, as much as 700,000 cubic yards of dry excavation had been made, a large amount of material and plant had been delivered and placed in commission, and a complete organization in all its parts was effectively developed into active working condition. The commission or its committees had spent a considerable time on the ground, so that 30 meetings had been held on the isthmus, with 27 at Washington and 2 at New York.

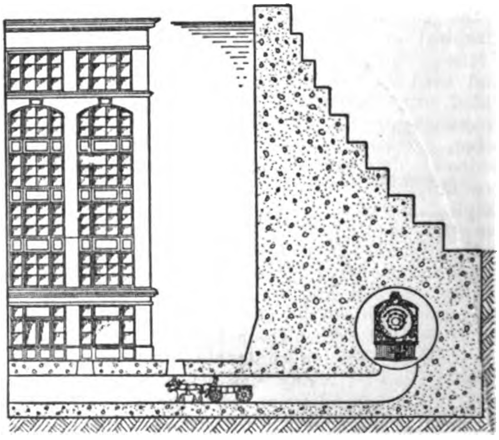
New Panama Commission. President Roosevelt and Secretary of War Taft, however, had concluded that a different commission was required to carry on the work thus effectively organized, and a new commission was appointed on April 1, 1905, which the President directed to be divided into three departments—one dealing with the government of the Canal Zone, sanitation, etc.; a second dealing with the actual work of construction; and the third embracing the functions of financing the operations of the commission, of purchasing supplies, of overseeing the operation of the Panama Railroad, all of the stock of which had a short time earlier been acquired by the United States government. As the head of the first department the President appointed Charles E. Magoon; John F. Wallace was made the head of the engineering and construction department, and Theodore P. Shonts was appointed chairman of the commission and placed in charge of the department of finance and supplies. The three men named were to constitute an executive committee, to act in the intervals between the meetings of the full commission of seven members.

Shortly after the organization of this second personnel of the commission, Chief Engineer Wallace resigned, and John F. Stevens was appointed in his place and retained the position of Chief Engineer for more than a year.

Plan of Canal. The studies of the first personnel of the commission indicated that a sea-level canal was entirely feasible, and in order to investigate and determine that question President Roosevelt convened an international board of consulting engineers of 13 members—eight from the United States, one from England, two from France, one from Germany, and one from Holland—and charged them with the duty of reporting upon the proper type of canal to be constructed across the isthmus. This board

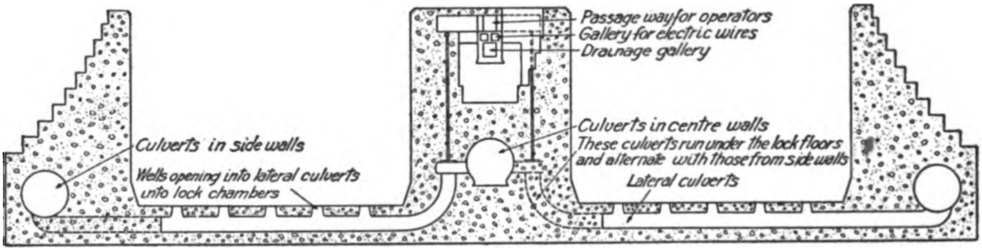


SECTION HYDROELECTRIC STATION AT GATUN DAM.



SIDE WALL OF PANAMA CANAL LOCKS COMPARED WITH SIX-STORY BUILDING.

reported in favor of the sea-level canal by a majority vote of eight in favor of the sea-level plan and a minority vote of five in favor of a lock plan. President Roosevelt, however, approved the minority plan for a canal with locks, the summit level to be 85 feet above sea level, necessitating a large earth dam at Gatun about seven miles from deep water in the Bay of Limón, with three twin locks in it in series each having a lift of about 28.5 feet. (For detailed description of Gatun Dam with section and plan, see DAMS AND RESERVOIRS.) At the Pacific end of the canal four earth dams were projected—one across the Río Grande River at Pedro Miguel, 6 miles from Panama Bay, with a lock of 30-foot lift, one large earth dam across the mouth of the Río Grande at La Boca (now Balboa) with twin flights of two locks each with a lift of 27.5 feet, and two smaller dams closing gaps or saddles between adjoining hills to the east of the Río Grande. The locks recommended in the minority report had a usable length of 900 feet and a usable width of 95 feet; the least bottom width of the canal (in the Culebra Cut) was to be 200 feet and the depth of water not less than 40 feet. The estimated cost of this lock plan was $139,705,000. The estimated time for construction was nine years. This report was made in January, 1906, and, after the approval by the President of this lock plan, the commission adopted it, and all measures were from that time on directed to a corresponding construction.


Passage way for operators
Gallery for electric wires
Drainage gallery
Culverts in centre walls
These culverts run under the lock floors and alternate with those from side walls
Lateral culverts
Culverts in side walls
Wells opening into lateral culverts into lock chambers

CROSS SECTIONS OF LOCK CHAMBERS AND WALLS OF LOCKS.

Soon after the plan for the canal with locks was adopted measures were carefully considered with a view to having the work of construction placed in the hands of contractors under suitable conditions. After much consideration of the entire question, however, and after negotiations with contractors involving at least approximate prices for the work, the proposed method of procedure was abandoned, and the government decided to complete the construction with its own forces and proceeded to do so.

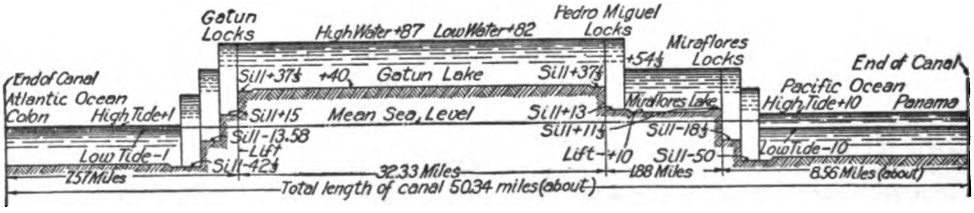
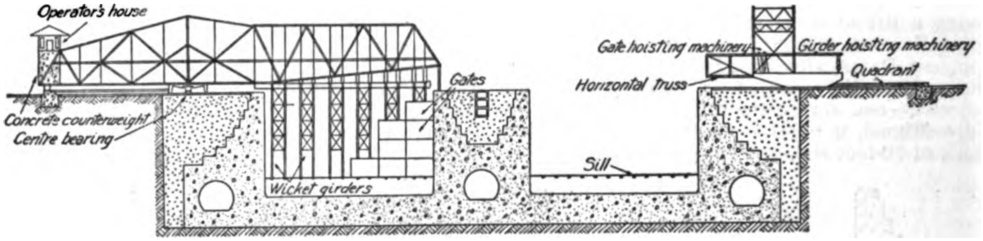


DIAGRAM SHOWING ELEVATION OF GATUN LAKE.

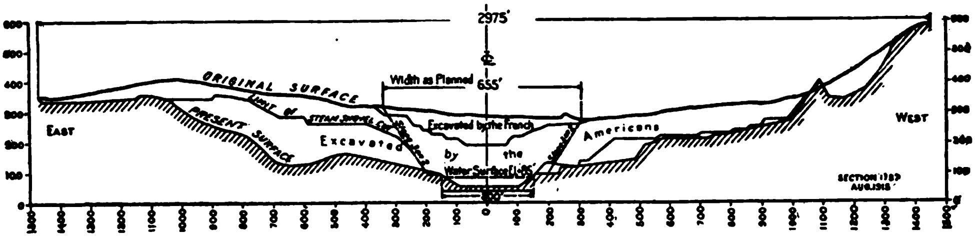
Final Organization of Commission. Towards the end of 1906 Mr. Shonts, chairman of the commission, resigned, and a short time after Mr. Stevens also resigned as chief engineer. This made the reorganization of the commission again necessary, and in 1907 the entire work was placed in charge of the Engineer Corps of the United States Army, Lieut. Col. G. W. Goethals being made chairman and chief engineer of the reorganized commission. The remainder of the commission was Lieut. Col. H. F. Hodges, Corps of Engineers, U.S.A.; Lieut. Col. William L. Sibert, Corps of Engineers, U.S.A.; Lieut. Col. D. D. Gaillard, Corps of Engineers, U.S.A.; Col. W. C. Gorgas, M.D., U.S.A.; H. H. Rousseau, U.S.N.; and M. H. Thatcher, head of the Department of Civil Organization. This organization with one or two changes only in personnel continued until the work was completed.

Further studies of the general plan of the canal, in connection with more thorough investigation of the physical conditions existing at different points of the line, made it advisable to change not only many details of the general plan, but also to rearrange fundamentally the canal plans at the Pacific end of the line. It was found impracticable to construct the earth dams on the excessively soft material at the sites contemplated in the minority lock plan at the mouth of the Río Grande River and between the adjoining hills. In fact, attempts to construct one of the smaller of the three dams contemplated failed through the inability of the soft material to hold the excavated material dumped upon it from the Culebra Cut. It became necessary, therefore, to abandon that part of the minority plan and carry a sea-level section of the canal up to Miraflores, about 5 miles inland from Panama Bay. A dam was constructed at that point, alongside of which are built twin flights of locks, each with a lift of 27.5 feet, making the normal level of the water of both these locks about 55 feet above mean tide in Panama Bay. This modification of the minority plan had incidentally the material advantage of placing the Miraflores locks, the lower of which is also a tidal lock, in an inland position better protected from enemy gun fire in case of attack in time of war. The Pedro Miguel Lock, about a mile farther north from Miraflores, with its lift of about 30 feet, remained unchanged. These three locks near the Pacific end of the canal give the requisite lift up to the summit level in Gatun Lake. Although the extreme range of tide in Panama Bay is fully 23 feet and less than 2 feet in Limon Bay, mean sea level has practically the same elevation at both points.



SECTION OF LOCKS SHOWING EMERGENCY DAMS AT MIRAFLORES.

Dimensions of Canal. Again, while the comparatively small locks recommended in the minority report of the international board had the manifest advantage of reducing the estimates of apparent cost and time, naval authorities urged that they should be made larger. Hence the usable dimensions of 1000 feet length and 110 feet width were adopted in the place of the recommended dimensions. Similarly the bottom width of the canal was increased at a number of places to a minimum of 300 feet in the Culebra Cut, increasing the yardage to be excavated and the corresponding cost. The depth of the canal was also increased to 45 feet in the Culebra Cut, making the bottom of the cut 40 feet above sea level. The soft material underlying the Gatun Dam also made it prudent to relieve the load on it by reducing the height of the dam by 30 feet. The total length of the canal between deep water at Colón and that in Panama Bay is 50.3 miles and about 41 miles between shore lines.

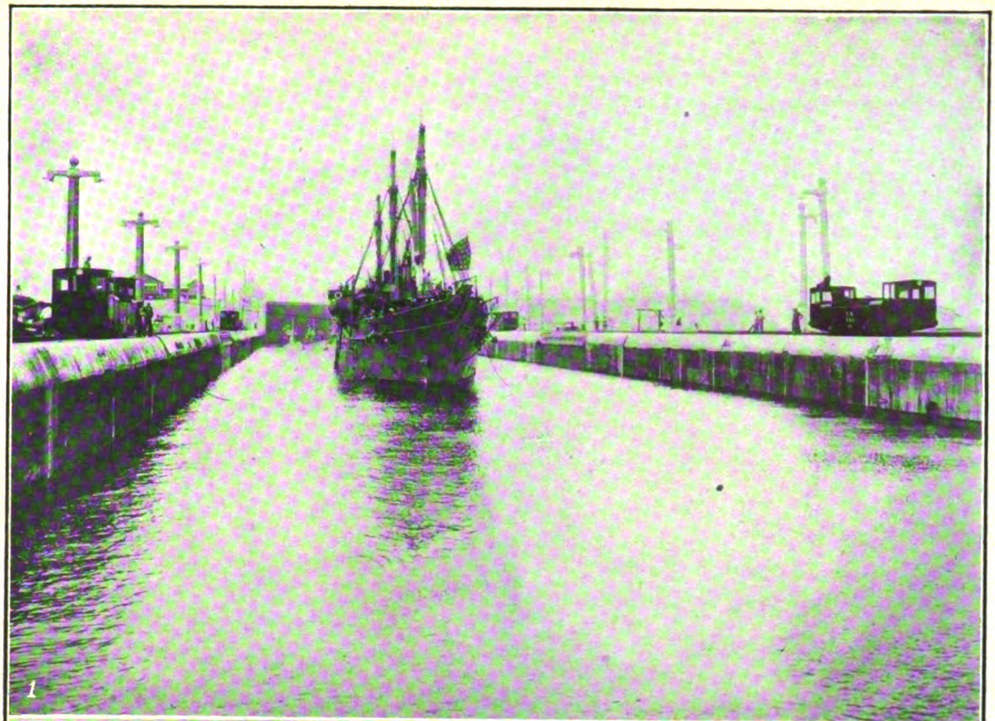


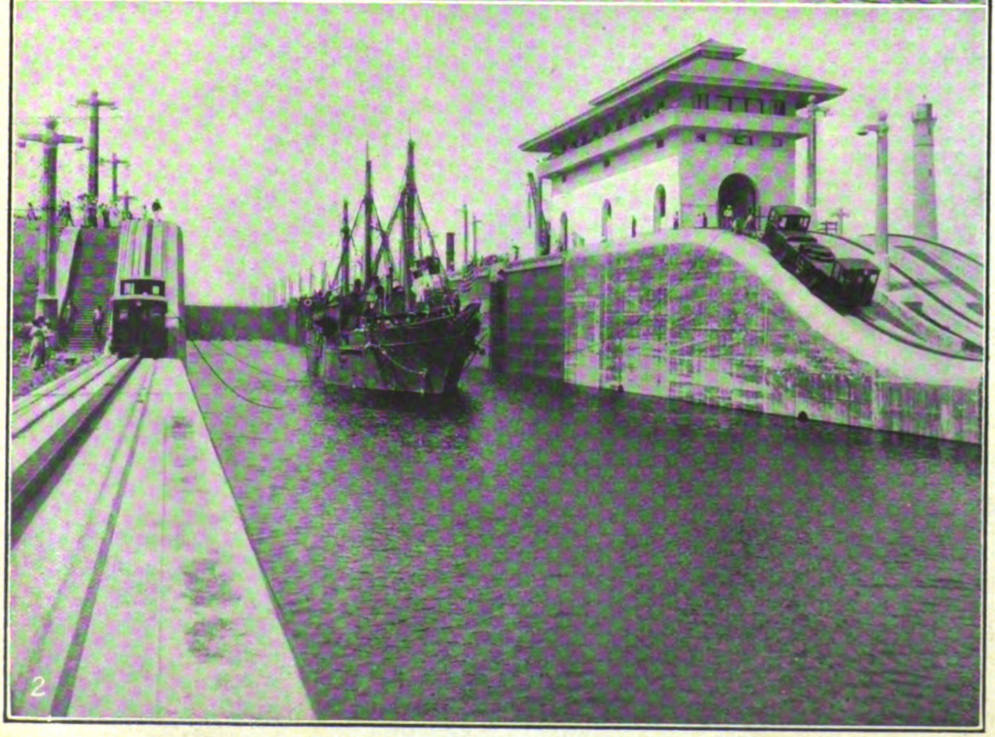
PANAMA CANAL. CROSS SECTION (NO. 1787) AT GAILLARD (CULEBRA) CUT, AUGUST, 1915.

Earth Slides. Much concern has been expressed at times at the fact that great masses of earth, constituting the adjoining banks in the deepest parts of the Culebra Cut, which by executive order of President Wilson was renamed Gaillard Cut after Col. David D. Gaillard, U.S.A. (q.v.), and at a place called Cucaracha immediately south of it, have slid down into the prism of the canal both before completion and since, necessitating the dredging of a large mass of material in order to restore navigation. Furthermore there have been points where the bottom of the canal prism has risen vertically a number of feet, although there is no soft material below that bottom. These slides, especially those of September and October, 1915, proved most serious, not only on account of the great expense for additional dredging, but for the valuable cargoes that were halted and the suspension of navigation. They were first noticed when the old French Company began work in and adjoining the Culebra Cut, although new slides have also developed. The material where these slides occur consists of both clay with some subsurface water and a material which might be mistaken for very soft rock of volcanic origin and which crushes readily with the weight of the high mass of material remaining in place on either side of the cut. The slides therefore result from two causes—one the slipping of the wet or moist clay, and the other the crushing of the volcanic material—but both produce the same lateral movement into the canal and may produce the uplift of the floor of the canal. As soon as enough material is excavated to reduce the slopes sufficiently where these slides have taken place, they doubtless will stop.

Opening of Canal. The first self-propelled boat to pass through the canal was a crane boat, the *Alex. La Valley*, which made the passage on Jan. 7, 1914. This boat had a length of 186 feet, 48 feet beam, and 14 feet draft. Commercial traffic was inaugurated through the canal, Aug. 15, 1914, by the passage of the government steamship *Ancon* carrying the Secretary of War with 200 guests, the passage being made in 9 hours, 40 minutes. From that time the canal has been open for general traffic, except when the slides at Culebra Hill and at Cucaracha have interrupted navigation. In the first year, ending Aug. 14, 1915, 1317 ocean-going vessels with an aggregate net tonnage of 4,596,644, Panama Canal measurement (average 3490 net tons each), passed through the canal. The total tolls were $5,216,149.

Canal Toll Rates. Tolls are levied on the basis of the cargo and passenger carrying capacity of each vessel passing through the Panama Canal by virtue of an Act of Congress approved Aug. 24, 1912, and subsequent amendments. The 1912 Act contained a provision exempting American vessels engaged in coastwise trade from paying tolls, and this led to considerable discussion in America, and more or less formal opposition on the part of Great Britain, so that in 1914 a bill repealing this provision was

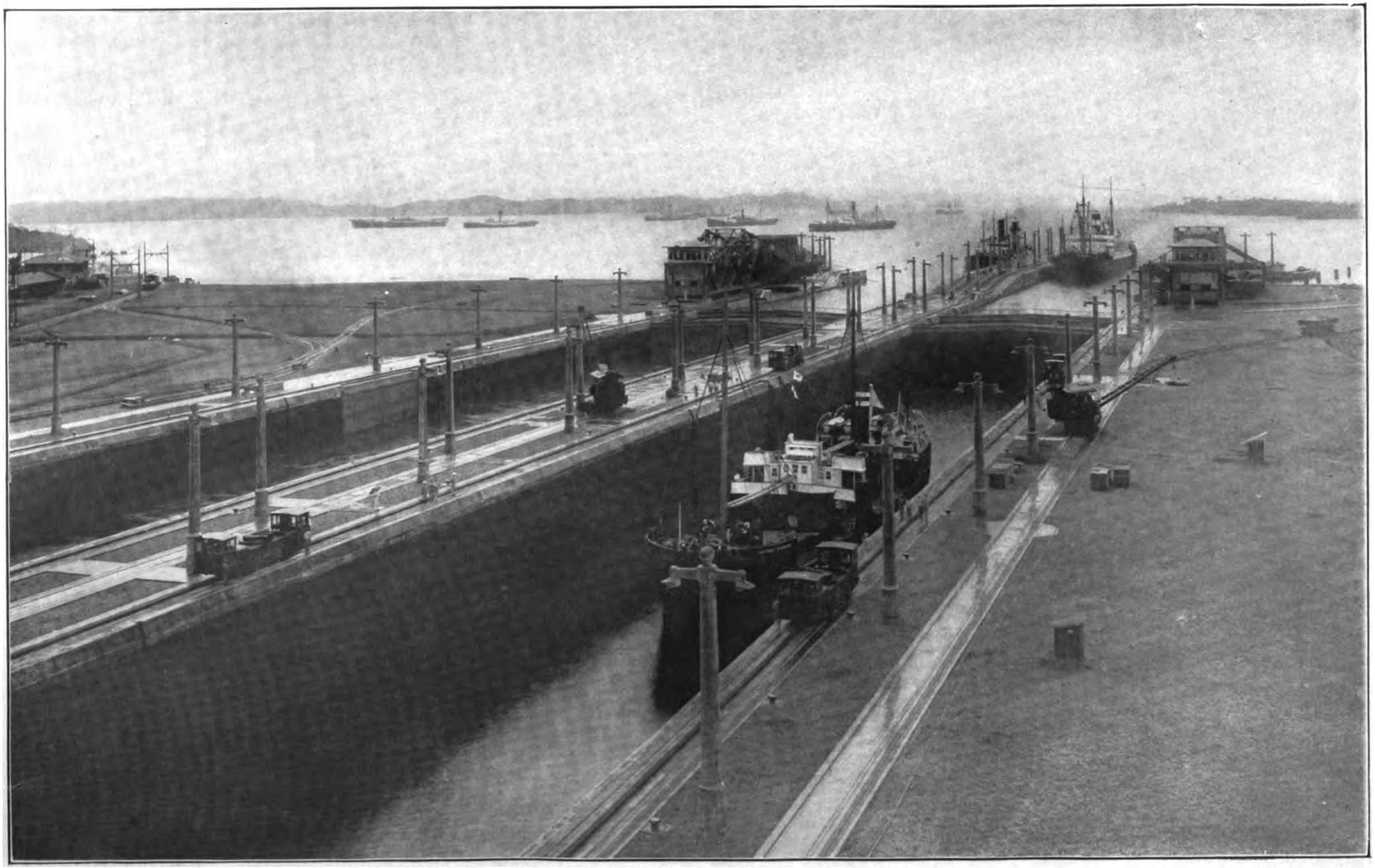




TOWING BY ELECTRIC LOCOMOTIVES AT GATUN LOCKS

1. U. S. S. "SEVERN" IN THE MIDDLE EAST CHAMBER, READY FOR LOWERING WATER
2. THE SAME VESSEL LEAVING UPPER EAST CHAMBER IN TOW OF ELECTRIC LOCOMOTIVES

PANAMA CANAL



THE GATUN LOCKS IN OPERATION

THE ENTRANCE TO THE LOCKS FROM GATUN LAKE. SHIPS ARE SHOWN WAITING PASSAGE THROUGH THE LOCKS passed with an amendment which stated that the passage of this Act was not to be considered as a waiver or relinquishment of any rights, treaty or otherwise, possessed by the United States to discriminate in favor of its own vessels, or with respect to the sovereignty, management, and operation of the canal and its traffic.

On the opening of the Panama Canal the system of levying tolls previously announced by President Taft in a proclamation was put into effect. The amount of the tolls is determined by a special set of rules of measurement for the Panama Canal, in which the net tonnage of the vessel is the units of interior space of 100 cubic feet, or 2.83 cubic meters, which may be devoted to carrying cargo or passengers, with an additional charge for open space on deck occupied by cargo or deck load. The surveyor of any port in the United States may measure a vessel for the Panama Canal certificate, as may also duly appointed foreign officials and local officials of the canal administration. The gross tonnage, according to the Panama Canal rules, includes the cubical contents of all spaces below the upper deck, and of all permanently covered or closed in spaces on or above that deck, excepting such as are specifically exempt. No space not included in the gross tonnage is ever deducted in the determination of the net tonnage, and the canal system of designation of tonnage differs from the systems in practice in the United States and various foreign nations and from that employed for the Suez Canal.

On loaded commercial vessels the toll charge is $1.20 per net canal ton, plus $1.20 per 100 cubic feet deck load, provided that the sum of these charges shall not exceed an amount equivalent to a charge of $1.25 per net ton on the vessel, as measured for United States registry. Vessels going through the canal without cargo or passengers, i.e., in ballast, are charged 72 cents net per canal ton, provided that if this amount is not equivalent to the product of the vessel's net tonnage according to measure for American registry by 75 cents, the larger sum shall be collected.

As ordinary steamship agents charge freight on the basis of space, rating 40 cubic feet as a ton, the 100 cubic feet called a ton in canal measurement would contain 2½ tons of cargo on that basis, and with ideally compact loading the canal toll is equivalent to a charge of 48 cents per ship's ton of cargo, but with the great variations in loading there is considerable difference in the toll charge, which in the first year of operation of the canal averaged approximately 75 cents per ton of cargo, as declared in the ship's manifest.

Cost of Construction. The French excavation available for the completed lock plan was 29,908,000 cubic yards. The estimated total American excavation for the approved minority lock plan was 95,955,000 cubic yards, while the total actual excavation amounted to about 239,000,000 cubic yards. The original estimated cost, as already indicated, was $139,705,000, excluding sanitation. The actual total cost of construction, including general expenses but excluding sanitation, has been $305,148,000, to which must be added $40,000,000 paid to the new Panama Canal Company, $10,000,000 to the Republic of Panama, $20,053,000 for sanitation, and $250,000 annually also to be paid to the Republic of Panama, making a total of $375,201,000 exclusive of the above annual payments.

Fortifications. After a most thorough discussion Congress in 1911 appropriated $2,000,000 for the construction of seacoast batteries on the Canal Zone and $1,000,000 for cannon, including one 16-inch gun already constructed. The Act specified that the ultimate cost of the cannon, including their carriages, sights, etc., should not exceed $1,965,000. In the ensuing year an additional $1,000,000 was appropriated for batteries. These appropriations were supplemented by others, which included amounts for ammunition, fire control, electric light and power, searchlights, field fortifications, trails, barbed wire, etc.

The plans for the main defensive works were prepared under the direction of the Chief of Engineers, U.S.A., and their construction was directed by the canal officials. The 1914 report anticipated that a large portion of the works would be completed in 1915, and recommendation was made for funds necessary for their maintenance and supply. The redoubts were also reported as completed, as well as the clearing necessary in connection with them.

The various forts and batteries have been officially named in orders, and in June, 1915, their coast-artillery garrisons aggregated eight companies. In addition there is stationed on the Zone a mobile army force of one brigade, consisting of three regiments of infantry and a quota of engineer and other special troops.

Bibliography. United States Isthmian Canal Commission, *Report, 1899* et seq. (Washington, 1901); id., *Report on Construction* (ib., 1904 et seq.); W. H. Burr, *Ancient and Modern Engineering and the Isthmian Canal* (New York, 1902); id., "Panama Route for a Ship Canal," in *Smithsonian Institution, Annual Report, 1902* (Washington, 1903); C. H. Huberich, *The Trans-Isthmian Canal: A Study in American Diplomatic History, 1825–1904* (Austin, Tex., 1904); J. R. Smith, *Organization of Ocean Commerce* (Philadelphia, 1905); United States Board of Consulting Engineers on Panama Canal, *Report* (Washington, 1906); W. F. Johnson, *Four Centuries of the Panama Canal* (New York, 1906); H. L. Abbot, *Problems of the Panama Canal, Including Climatology of the Isthmus, Physics and Hydraulics of the River Chagres* (2d ed., ib., 1907); *Canal Record*, published by the United States Isthmian Canal Commission (Ancon, 1907 et seq.); W. J. Curtis, *History of the Purchase by the United States of the Panama Canal* (Birmingham, Ala., 1909); C. F. Adams, *Panama Canal Zone: An Epochal Event in Sanitation* (Boston, 1911); Harmodio Arias, *The Panama Canal: A Study in International Law and Diplomacy* (London, 1911); C. H. Forbes-Lindsay, *Panama and the Canal Today* (Boston, 1912); E. R. Johnson, *Panama Canal Traffic and Tolls* (Washington, 1912); G. M. Sternberg, *Sanitary Lessons of the War* (ib., 1912); G. C. Butte, *Great Britain and the Panama Canal: A Study of the Tolls Question* (Heidelberg, 1913); E. R. Johnson, *Measurement of Vessels for the Panama Canal* (Washington, 1913); J. S. Mills, *The Panama Canal: A History and Description of the Enterprise* (London, 1913); L. F. R. Oppenheim, *The Panama Canal Conflict between Great Britain and the United States of America* (Cambridge, 1913); Sir H. E. Richards, *The Panama Canal Controversy* (Oxford, 1913); *Statement Concerning the Exemption of American Coastwise Vessels from Tolls in the Panama Canal*, pub-

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PANAMA CANAL—PRINCIPAL STATISTICS

Air-line distance from shore to shore from Pacific to Atlantic end of canal (miles, approximately)	30
Length from deep water to deep water (miles)	50.3
Length from shore line to shore line (miles)	40
Bottom width of channel, maximum (feet)	1,000
Bottom width of channel, minimum, 9 miles in Gaillard (Culebra) Cut (feet)	300
Locks (three sets), in pairs	12
46 gates of 2 leaves each, each leaf 65 feet long, ranging from 47 to 82 feet in height, weighing from 390 to 730 tons each. The 82-foot gates occur only at the lower end of Miraflores locks, where they are necessary on account of tidal conditions.	
Locks, usable length (feet)	1,000
Locks, usable width (feet)	110
Gatun Lake, surface height above sea level (feet)	85
Gatun Lake, area (square miles)	164
Gatun Lake, area of tributary watershed (square miles)	1,320
Gatun Lake, channel depth (feet)	85–45
Gatun Dam, width at base (miles)	½
Gatun Dam, width at top (feet)	100
Gatun Dam, above sea level (feet)	103.5
Contains 10.728,965 cubic yards of wet fill and 12,229,104 cubic yards of dry fill or a total of 22,958,069 cubic yards.	
Gatun Dam Spillway, discharge channel, width (feet)	285
Gatun Dam Spillway, discharge channel, length (feet)	1,200
Gatun Dam Spillway, across upper end, length (feet)	808
Gatun Dam Spillway, above sea level, height (feet)	69
Gaillard (formerly Culebra) Cut, length (miles, approximately)	8
Gaillard (formerly Culebra) Cut, channel depth (feet)	45
Gaillard (formerly Culebra) Cut, total excavation to Feb. 1, 1915 (cubic yards)	117,077,044
Additional excavation due to slides to Feb. 1915 (cubic yards)	35,158,225
Miraflores Lake, surface height above sea level (feet)	54⅔
Excavation canal proper, estimated total (cubic yards)	209,668,000
Excavation, permanent structures, including terminals, estimated (cubic yards)	22,685,000
Excavation, grand total, estimated (cubic yards)	232,353,000
Excavation by the French (cubic yards)	78,146,960
Excavation by French, useful to present canal (cubic yards)	29,908,000
Excavation by French, estimated value to canal	$25,389,240
Value of all French property	$42,799,826
Concrete, total estimated for canal (cubic yards)	5,208,800
Time of transit through completed canal (hours)	10–12
Time of passage through locks (hours)	3
Relocated Panama Railroad, total cost	$8,866,392.02
Relocated Panama Railroad, length (miles)	47.11
Canal Zone, area (square miles)	436
Canal and Panama Railroad force actually at work in September, 1913 (about)	37,000
Canal and Panama Railroad force, Americans, in September, 1913 (about)	5,000
Cost of canal, estimated total	$375,000,000
Work begun by Americans	May 4, 1904
Date of opening	Aug. 15, 1914

DISTANCES SAVED BY PANAMA CANAL

	MILES
New York to San Francisco, California:	
Via Strait of Magellan	13,135
Via Panama Canal	5,262
Saving	7,873
New York to Yokohama, Japan:	
Via Suez Canal	13,040
Via Panama Canal	10,093
Saving	2,947
New York to Manila, Philippine Islands:	
Via Suez Canal	11,556
Via Panama Canal	11,546
Saving	10
New York to Sydney, New South Wales:	
Via Suez Canal	14,560
Via Panama Canal	9.850
Saving	4,710
New York to Valparaiso, Chile:	
Via Strait of Magellan	8.460
Via Panama Canal	4,637
Saving	3,823
New York to Iquique, Chile:	
Via Strait of Magellan	9.221
Via Panama Canal	4,021
Saving	5.200
New York to Guayaquil, Ecuador:	
Via Strait of Magellan	10,270
Via Panama Canal	2.765
Saving	7.505
San Francisco to Rio de Janeiro, Brasil:	
Via Strait of Magellan	8,339
Via Panama Canal	7.678
Saving	661
San Francisco to Pará, Brasil:	
Via Strait of Magellan	10.852
Via Panama Canal	5.642
Saving	5.210
San Francisco to Cape Town, British South Africa:	
Via Strait of Magellan	10 454
Via Panama Canal	9,898
Saving	556
Liverpool to San Francisco, California:	
Via Strait of Magellan	13.503
Via Panama Canal	8 038
Saving	5.465
Gibraltar to San Francisco, California:	
Via Strait of Magellan	12.734
Via Panama Canal	7,642
Saving	5,092

New York via Panama Canal is nearer to Yokohama than Liverpool by 1800 miles and nearer to Sydney by 2424 miles.

NUMBER OF DAYS SAVED BY A VESSEL USING THE PANAMA CANAL

	TRAVELING AT KNOTS PER HOUR			
	10	12	14	16
From New York to San Francisco, California	32.3	26.8	22.9	20.0
From New York to Honolulu, Hawaiian Islands	27.0	22.4	19.1	16.7
From New York to Guayaquil, Ecuador	30.3	25.2	21.5	18.7
From New York to Callao, Peru	25.5	21.2	18.1	15.7
From New York to Iquique, Chile	20.9	17.3	14.8	12.9
From New York to Valparaiso, Chile	15.1	12.5	10.6	9.2
From New York to Yokohama, Japan	15.2	12.6	10.7	9.3
From New York to Shanghai, China	7.3	6.0	5.1	4.4
From New York to Adelaide, South Australia	6.7	5.6	4.6	4.0
From New York to Sydney, New South Wales	15.8	13.1	11.2	9.7

PANAMA CONGRESS. A congress of delegates representing various nations of America, which met at Panama in June, 1826, for the consideration of questions of common interest. Soon after the establishment of the independence of the South and Central American republics and of Mexico, a movement, largely under the direction of Simon Bolívar (q.v.), President of Colombia, was set on foot for the organization of an American confederacy. In 1823 Bolívar invited the governments of Mexico, Peru, Buenos Aires, and Chile to send to Panama delegates empowered to take such action; but Buenos Aires and Chile held back, and in December, 1824, Bolívar sent a circular letter to all the Spanish-American republics, proposing that each appoint representatives to assemble immediately at Panama. This invitation was promptly accepted by Mexico, Peru, Chile, Colombia, and Guatemala, and in November, 1825, the ministers of Mexico, Colombia, and Guatemala at Washington formally invited the United States to send delegates to the proposed congress, stating in a general way the questions which would be brought up for discussion. President Adams, influenced largely by Henry Clay, then Secretary of State, promptly accepted the invitation and in his annual message to Congress aroused his enemies with the statement that "ministers will be commissioned to attend." This was the signal for one of the most animated debates in the history of the United States Congress, opposition being aroused particularly by the fear of "entangling alliances," by the proposed discussion of the recognition of Haiti, the suppression of the slave trade, and the liberation from Spanish rule of Cuba and Porto Rico, and to some extent by the reluctance on the part of many to commit the United States to the policy enunciated in the Monroe Doctrine. Finally, however, Adams's appointment of two envoys extraordinary, Richard C. Anderson and John Sergeant, was ratified by the Senate, and an appropriation for the mission was voted in the House. The congress met on June 22, 1826, Colombia, Central America, Peru, and Mexico being represented. Chile, Brazil, and Buenos Aires approved of the congress, but did not send delegates. After holding 10 sessions and agreeing to a treaty of perpetual union for defense against Spain, the congress adjourned to meet again at Tacubaya, Mexico, in the following year. The treaty of union was subsequently ratified only by Colombia. The United States was not represented, Anderson having died on the way to Panama, and Sergeant not reaching that place until after the congress had adjourned. The meeting at Tacubaya was never held Consult J. B. McMaster, *History of the People of the United States*, vol. v (New York, 1904).

PANAMA HATS. Hats made from the immature unexpanded leaves of the stemless screw pine (*Carludovica palmata*), also called jipijapa, a native of Central America and Colombia. After special treatment to remove the soft parts of the leaf, the fibre is soaked to render it pliable, and the weaving is done under water. The hats most valued are made from single leaves. The plant from which the hats are made has been introduced into Java, while experiments for its introduction into the Philippines were also made, as the Filipinos are expert hat makers.

PANAMA-PACIFIC INTERNATIONAL EXPOSITION. An international world's fair held in San Francisco, Cal., from Feb. 20 to Dec. 4, 1915, for the purpose of celebrating the construction and opening of the Panama Canal. It was the third exposition of its class held in the United States and the twelfth of its class held anywhere in the world. When it was decided to celebrate the completion of the Panama Canal by an exposition, the selection of a place at which to hold it was considered by Congress, and in 1911, after hearing the claims of New Orleans and San Francisco, a decision was made in favor of the last named. A popular subscription of $7,500,000 was raised by the citizens of San Francisco, a tax levy of $5,000,000 was voted by the State, a bond issue was authorized by the municipality of San Francisco, and a further tax levy for county displays was enacted by the Legislature that approximated $3,000,000, making a total of $20,500,000, and on the day the exposition opened it was estimated that its cost represented an aggregate expenditure of over $50,000,000.

A site including 635 acres was chosen on the water front of San Francisco Bay just within the Golden Gate. It is about 3 miles long, and from ⅓ to ½ mile wide, backed by low hills, and about 2 miles from the business centre of San Francisco. These grounds were divided into three sections. In the centre were grouped the 11 great exhibit palaces and Festival Hall. To the west, spreading fan-shaped along the bay, were the pavilions of the foreign nations as well as the various States of the Union, while beyond were the Live Stock Exhibit Building and race track, covering 65 acres, the aviation field, and the drill grounds. To the east of the main exhibits were the amusement features.

Actual construction began on Oct. 14, 1911, when President Taft turned the first spadeful of dirt. Eight of the larger exhibit palaces were grouped together in a rectangle, which was flanked on each end by an additional palace. Separating these buildings were connecting courts and avenues. In the centre was the Court of the Universe, designed by McKim, Mead, and White, 700 feet long and 900 feet wide, with a sunken garden in the centre. This court represented the meeting place of the Eastern and Western hemispheres, and the decoration schemes on either side were typical of these themes. On the extreme east and west were two triumphal arches—the one on the east, called the Arch of the Rising Sun, was surmounted by a statuary group of the Nations of the East, while in the west was the Arch of the Setting Sun, with a similar group representing the Nations of the West. To the east of the Court of the Universe at the intersection of the avenues was the Court of Abundance, designed by Louis C. Mullgardt to show the Oriental phase of Spanish-Moorish architecture; and to the west was the Court of the Four Seasons, designed by Henry Bacon, which had for its inspiration the historic Roman villa of Hadrian. Two minor courts—that of Flowers in the east, and that of Palms in the west—were designed by George W. Kelham. The dominating feature of the architectural plan was the Tower of Jewels, designed by Carrere and Hastings. It stood at the south entrance to the grounds and was 433 feet high. It was the centre of brilliant night illumination, as its outline was defined by thousands of hand-cut glass jewels that flashed and scintillated in many tints and colors. The Palace of Fine Arts, designed by R. B. Maybeck, flanked the extreme west end of the group. It was 1100 feet long and fireproof. To the north and west were two palaces of Agriculture. The first was devoted to the exhibition of food products, while to the east was the one in which was shown every possible phase of agricultural industry. Still to the east and beyond the Court of the Universe was the Palace of Transportation. Then came the Palace of Mines and Metallurgy at the northeast end of the rectangle. Facing the Palace of Fine Arts and flanking the east end of the rectangle was the Palace of Machinery, designed by Ward and Blohme. It was 968 feet long and 368 feet wide and was the largest building on the grounds. At the southeast end of the rectangle was the Palace of Manufactures and Varied Industries. On the other side of the Court of the Universe was the Palace of Liberal Arts. This building was 585 feet long and 470 feet wide. The final building in the group was the Palace of Education and Social Economy. To the south was the Palace of Horticulture, designed by Bakewell and Brown, 672 feet long and 320 feet wide, constructed almost entirely of glass. Unless indicated, no one person designed the palaces forming the central group. They were composite in design, dominating the court on which they stood. The prevailing color used on the buildings was a soft neutral tint, resembling smoked ivory, although color grouped in large masses of reds, blues, greens, and gold was used for decorations.

The grounds were laid out by skillful landscape gardeners, who used millions of blossoming flowers in the gardens and courts and planted quick-growing vines that spread rapidly along the walls of the buildings. Over 250 groups and hundreds of individual pieces of statuary were employed in the beautifying of the grounds.

The exhibits were under the charge of a Director of Exhibits and were distributed among 11 departments, each of which was in charge of a chief. Congress appropriated $500,000 for the exhibits of the departments in Washington and later contributed an additional $500,000 for a building in which to show the development and progress of the government. Forty-four States and Territories made provisions for participating in the exposition, and many of these erected State buildings. Thirty-six foreign nations accepted the invitation of the United States government to take part, and many erected artistic pavilions.

A series of commemorative postage stamps of the values of 1, 2, 5, and 10 cents were issued by the United States Post Office Department.

PAN-AMERICAN CONFERENCE. After the failure of the Panama Congress, held in 1826, to effect a close union among the American republics for their common welfare, various efforts followed at intervals to bring together a conference for a further discussion of the important questions of common interest to the republics of America. Finally in 1847 a conference representing five South American republics was held at Lima and resulted in treaties of confederation and of commerce and navigation, a consular convention, and a postal treaty. Again, in 1864 a conference representing seven South American republics and one Central American state was held at Lima to form a Latin-American Union. Its work was without substantial result. In 1878 a third conference was held at Lima and consisted of representatives from seven South American states and the island of Cuba. Treaties of international law and extradition were prepared and afterward ratified by Guatemala and Uruguay.

On Oct. 2, 1889, a conference representing every American republic except Santo Domingo met at Washington under the presidency of Mr. Blaine. The conference, which is often referred to as the **first Pan-American Conference,** remained in session till April 21. Its work consisted of a number of recommendations, few of which were ever adopted by the governments interested. The principal of these related to the free navigation of American rivers, a uniform system of weights and measures, a uniform standard of value, an international banking system, uniform extradition treaties, reciprocity, uniform consular fees, harbor fees and regulations, uniform sanitary regulations, and the establishment of a bureau of information for disseminating intelligence as to the commerce and resources of the American republics.

Second Pan-American Conference. In December, 1899, the government of the United States suggested the holding of another conference, and upon the invitation of the government of Mexico the city of Mexico was chosen for the place of meeting, and the date set was Oct. 22, 1901. Eventually the governments of all the American republics accepted the invitation, and the conference met on the date appointed. It adjourned Jan. 31, 1902. The more important recommendations of the conference were a protocol of adhesion to The Hague Convention for the settlement of international disputes; a treaty of compulsory arbitration signed by 10 delegations, and resolutions favoring construction of a Pan-American railway; an international customs congress for international sanitation and for the collection and publication of statistics relative to American trade and resources.

The **third Pan-American Conference,** at which all the republics except Venezuela and Haiti were represented, was in session at Rio de Janeiro from July 23 to Aug. 27, 1906. Like its predecessors, it had no legislative powers, but was an advisory body to the governments represented. The most prominent subjects of discussion were international arbitration and the Drago Doctrine, which denies the right of one government to collect by force a debt from another government or from a citizen of another country. The conference recommended that both questions be referred by the several governments to The Hague Conference; it declared itself, however, in favor of a general arbitration agreement, but in regard to the Drago Doctrine went only so far as to recommend that The Hague Conference be invited to make a study of the question of the compulsory collection of public debts. The conference reorganized the Bureau of American Republics (in this particular it had legislative power) and made various recommendations in regard to naturalization, patents, copyrights, municipal sanitation, etc. The American Secretary of State, Elihu Root, in the course of a trip to various South American cities, touched at Rio de Janeiro while the conference was in session, and in a speech impressed the Latin-American representatives with the friendly attitude of the United States towards the other American republics.

A fourth Pan-American Conference was held at Buenos Aires in 1910. Among the matters discussed were treaties on patents, trademarks, and copyrights. A resolution was adopted recommending a general agreement for the arbitration of all claims of a pecuniary character. The conference of 1906 had provided for the creation of an international commission of jurists to formulate codes of international law for the American nations. The first meeting of this commission was held at Rio de Janeiro in 1910.

In 1915 a Pan-American commercial congress was held at Washington, partly with the object of devising means for coping with the difficulties in American trade and finance created by the European War.

PAN-AMERICAN EXPOSITION. An exposition held in Buffalo, N. Y., from May 1 to Nov. 2, 1901. It had for its purpose the illustration of the progress of civilization in the Western Hemisphere during the nineteenth century and was originally planned for 1898, but the war with Spain intervened, and the enterprise was deferred until 1901. A site in the northern part of Buffalo, covering an area of 350 acres and within 3 miles of the business centre of the city, was chosen. The buildings were arranged around a broad court having the form of an inverted T with its broad end to the south, where an approach was made over a triumphal causeway. From this on the east towards the north were the group of government buildings, the Ethnology Building, the buildings of Manufactures and Liberal Arts, and Agriculture, while on the west side were the buildings of Electricity, Machinery, and Transportation, Temple of Music, and Horticulture, with its two wings, one of which was devoted to exhibits in graphic arts and the other to exhibits of mining. At the north end of the court thus formed, and balancing the Triumphal Causeway, was the Electric Tower. In addition to the foregoing there were two permanent buildings, one of which, constructed of white marble and bricks, served as an art building and is now the home of the Buffalo Fine Arts Academy, and the other, of white marble, was the New York State Building, which now contains the collections of the Buffalo Historical Society. The buildings on the east were arranged to represent man and his affairs, or what man had gained after long years of strife with the elements, while those on the west represented the elements themselves. The struggle was denoted by heavy, deep coloring of red, blue, green, and gold, which graduated gently but firmly into tints, until the Electric Tower was reached, where the prevalent tone was a deep green, as near the color of Lake Erie as it was possible to attain. The tower, which had sculpture work on the four corners, itself was of a light ivory color and was tinted with blue, green, and gold, which grew fainter as the top was reached, terminating in a gilt figure of the Goddess of Light. The color treatment gained for the exposition the name of the Rainbow City, or the Tinted City. The sculpture was likewise harmonized with the general plan and was under the direction of Karl Bitter. At the entrance of the exposition the Triumphal Causeway, which was perhaps the most ornate feature, represented the apotheosis of the United States, an allegorization of national pride, while the Electric Tower at the other end symbolized the great waters, suggesting that the importance, growth, and prosperity of Buffalo were due chiefly to the Great Lake system and waterways on which it was located. On the east side of the Esplanade the most conspicuous work was the Fountain of Man, by Mr. Charles Grady; while on the west side, which was devoted to Nature, there was placed the Fountain of Nature, by Mr. George Brewster. All of the sculpture was in white staff. The exhibits were examined by a jury of awards, and upward of 4000 awards of gold, silver, and bronze medals, and honorable mentions, were made. The total attendance was given as 8,179,674. The total cost of the exposition was $8,860,757, and the total receipts were $5,534,643, leaving a deficit of $3,326,114. On September 6 President William McKinley (q.v.) was shot down by an assassin while holding a public reception in the Temple of Music, and he died eight days later at the house of John J. Milburn, the president of the exposition.

PANAMINT, păn'ȧ-mĭnt. See SHOSHONEAN STOCK.

PANARD, pȧ'när', CHARLES FRANÇOIS (1694–1765). A French song writer, born at Courville, near Chartres. He went to Paris in early life and was employed in the government bureau for many years. Panard was an industrious writer of vaudeville and song, and his works in this line number more than 800. His satire was never bitter and his humor never coarse, while there was in all he wrote an insinuating grace and gayety. Marmontel gives an attractive picture of him in his *Mémoires*. Partial collections of his works were made under the titles *Théâtre et œuvres diverses* (1764) and *Œuvres choisies de Panard* (1803).

PANAS, pȧ'nä', PHOTINOS (1832–1903). A French surgeon and ophthalmologist. He was born in Cephalonia of Greek parents and studied medicine at Corfu and in Paris (M.D., 1860), where he was naturalized in 1863. After service in various other hospitals he became surgeon to the Hôtel Dieu in 1877. Two years afterward he was appointed professor of clinical ophthalmology in the Ecole de Médecine. In general surgery Panas won a reputation by his services in the Franco-Prussian War, his introduction of Lister's methods into France, his pioneer work as a successful operator in ovariotomy, and his operation for congenital and paralytic ptosis. But he was better known for his ophthalmological work, and it is in this field that he wrote: *Leçons sur le strabisme* (1873 and 1883); *Leçons sur les kératites* (1876); *Leçons sur les affections de l'appareil lacrymal* (1877); *Leçons sur les rétinites* (1878); *Anatomie pathologique de l'œil* (1879), with Remy; *Sur le glaucome et les néoplasmes intraoculaires* (1893); *Traité des maladies des yeux* (1894); *Leçons de clinique ophtalmologique* (1899); *Etude de clinique ophtalmologique* (1903).

PAN'ATHENÆ'A (Lat. nom. pl., from Gk. Παναθήναια, *Panathēnaia*, from πᾶς, *pas*, all + Ἀθήνη, *Athēnē*, Athena). The most famous festival of Attica, celebrated at Athens in honor of Athena, patron goddess of the city. Two festivals were distinguished. The Lesser was annual, and its origin was attributed to King Erichthonius, though Theseus was said to have changed the name from Athenæa to Panathenæa in commemoration of the union of the Attic communities into a single state. It was celebrated by a solemn procession to the Acropolis, a sacrifice and public feast, and was preceded by an evening torch race. Probably gymnastic contests and chariot races were also held. Like the Lesser, the Greater Panathenæa was held on the twenty-eighth of the first month of the Attic year, Hecatombæon (approximately July). Its establishment was attributed to the tyrant Pisistratus in 566 B.C. The celebration occurred in the third year of each Olympiad, and reached its culmination in the great procession which escorted to the Acropolis the sacred peplus of Athena. The peplus was a crocus-colored mantle, embroidered by chosen women of noble blood, with scenes from the contest of the gods and the giants. At least as early as the end of the third century it was carried spread from the yard and mast of a ship on wheels. The procession included representatives of all the free population, the magistrates, old men with olive branches in their hands, maidens with the sacred utensils, the metics or resident foreigners with the vessels for the sacrifices, the cavalry, the chariots from the games, the animals for sacrifice, and all the other elements which were depicted by Phidias on the frieze of the Parthenon (q.v.). The five days before the offering were filled with contests of various kinds. Rhapsodists contended in recitations of the epic poems, and there were also musical contests. There were prizes for pyrrhic and cyclic choruses, and the 10 tribes presented in competition bands of young men chosen for their beauty and strength. There were the usual athletic contests for boys, youths, and grown men, seemingly in great numbers, but the chief feature of these games was the number of the horse races, which included not merely the usual chariot races with spans and four horses, but also a special variety, in which each chariot contained, besides the driver, an armed runner, who, as the chariot crossed the finish line, sprang from the moving car and ran back the length of the stadium. The last contest was a race of triremes off the Piræus. For the musical contests the prizes were money and crowns of gold and silver, for the choruses an ox for sacrifice, and for the athletic games vases filled with oil from the sacred olive trees. Many of these vases have been found, all similar in style, showing on one side Athena brandishing her lance, between two columns, and on the other a scene from the sport for which the vase was a prize. Consult: Adolf Michaelis, *Die Parthenon* (Leipzig, 1871); L. R. Farnell, *The Cults of the Greek States*, vol. i (Oxford, 1896); Theodor Mommsen, *Feste der Stadt Athen im Alterthum* (2d ed., Leipzig, 1898); P. Stengel, *Die griechischen Kultusaltertümer* (Munich, 1898); E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910).

PA′NAX. A genus of plants. See ARALIA; GINSENG.

PANAY, pá-nī′. One of the Philippine Islands, the westernmost of the Visayan group. It lies nearly in the geographical centre of the archipelago and is bounded on the north by the Visayan Sea, on the east and southeast by the Strait of Guimaras, from 9 to 56 miles wide, separating Panay from Negros, and on the west by the arm of the Sulu Sea known as the Mindoro Sea, which on the northwest separates Panay from Mindoro (Map: Philippine Islands, D 5).

Panay ranks fifth in size among the Philippine Islands. Its area is 4611 square miles, and, with the 118 dependent islands, 4910 square miles, the mainland being thus somewhat larger than the island of Corsica. It is broadly triangular in shape. Its southern and western coasts are very little indented and afford no harbors except open roadsteads. On the northeast and east coasts, however, there are numerous small bays and sounds with anchorages, sheltered by the adjacent islets. The best harbor is at Iloilo, on the strait of that name separating the island of Guimaras from the mainland. This harbor is the second in importance in the Philippines, distant 250 miles from Manila, and offers an anchorage for large vessels which is well protected. Guimaras, the principal dependent island of Panay, has an area of 228 square miles and lies in the narrowest part of the channel between Panay and Negros.

The centre of Panay is the nucleus of its mountain system, which consists of three principal mountain ranges radiating from that point to the three corners of the triangular island. These ranges divide the island politically into its three provinces and hydrographically into its three main drainage basins—that of the Panay River in the north, the Jalaur in the southeast, and the Cadián in the west. These dividing ranges are very rugged and almost insurmountable. They have a number of peaks exceeding 3000 and 4000 feet, several above 5000, and Mount Madiaás in the northwestern range has a height of 7264 feet. In each of the three basins the land descends gradually to the sea. The southeastern slope is gently undulating, while the western and northern are more rugged, with a number of outlying peaks. Extensive forests cover the uplands, and the lower slopes, especially in the southeast, have a pleasant parklike aspect, where deer, characteristic of the island, abound. The soil is everywhere fertile and well watered; besides the three rivers mentioned there are many smaller streams flowing through every part of the island. For climate and natural history, see PHILIPPINE ISLANDS.

As in the rest of the archipelago, the chief occupation is agriculture, and the staple products are rice, sugar, and copra. The shipment of sugar through the port of Iloilo in 1899 amounted to 77,641 tons and that of copra to 636 tons. In 1902 the sugar produced on the island amounted to 15,257,771 pounds and copra 916,217 pounds. The bulk of the sugar produced in the Philippines passes through Iloilo for export. Of the 232,761 tons exported from the islands in 1914, 169,385 tons were shipped from Iloilo. Other agricultural products are cotton, hemp, corn, coffee, tobacco, cacao, indigo, and pepper. There are large areas of fine grazing land in Panay, especially in Iloilo Province. Almost all this province is a fertile plain particularly adapted to the culture of sugar and rice. Before the war with Spain there were more than 200,000 head of live stock on the island, consisting chiefly of carabaos, sheep, and horses, the latter being highly prized throughout the archipelago. In 1902 there were 68,119 cattle, 2972 horses, and 60,150 swine. The mineral wealth has not yet been exploited, but there are known to be deposits of iron, gypsum, coal, and marble, while gold has been found in various localities. The manufacturing industry yields products in sufficient quantity for export. There are numerous looms in operation, producing fabrics of pineapple fibre, jusi, and sinamay. Coasting trade with the rest of the archipelago through the port of Iloilo is also very active. Panay has about 140 kilometers of railroad, the main line running from the town of Capiz to

Iloilo. It also has over 300 kilometers of first-class, 200 kilometers of second-class, and 250 kilometers of third-class highways.

The natives of Panay offered a spirited resistance to the authority of the United States from the beginning of the insurrection. The town of Iloilo was occupied and garrisoned by United States troops on Feb. 11, 1899, but the insurgents practically held the whole interior of the island until the beginning of active operations in the fall of 1900. The insurgents were then dispersed and driven to the mountains after a number of sharp engagements. The surrender of General Delgado in January, 1901, followed by that of other influential leaders, practically accomplished the pacification of the island, and on April 11, 1901, civil government was inaugurated. Under the Spanish rule the island was divided into the three provinces of Antique in the west, Capiz in the north, and Iloilo in the southeast, and the Comandancia of Concepción in the northeast. The last is now incorporated with the Province of Iloilo. The population of Antique was, in 1903, 132,627, that of Capiz, 229,950, and of Iloilo, 406,990, giving a total for the whole island of 769,207. The inhabitants were nearly all Visayans, there being only a few thousand savage Mundos and Negritos in the mountains. The capitals are San José de Buenavista (q.v.) in Antique and Capiz (q.v.) and Iloilo (q.v.) in the provinces of those names.

PANAY. A town of Panay, Philippines, in the Province of Capiz, situated 3 miles from the coast and 3 miles southeast of Capiz (Map: Philippine Islands, D 5). Pop., 1903, 14,361.

PANCATANTRA, or **PANCHATANTRA**, pän'chá-tän'trá (Skt., five threads, or books). The most important collection of Sanskrit beast fables. Its date is uncertain, but is probably as old as the fifth century A.D., since it was translated into Pahlavi in the sixth century by Barzoi, the court physician of the Sassanian King Khosru Anushirvan (531–579). The Pancatantra is almost certainly drawn from Buddhistic sources. Its analogies with the Jatakas (see JATAKA), or birth stories of the Buddha, are too close to admit of other explanation than direct borrowing. Thus, the mingling of maxims in verse with the prose story and the similarity of the beast fables of the Sanskrit work to many of the *jātaka* tales are resemblances both striking and significant. On the other hand, the original Buddhism of the Pancatantra has been modified and given a veneer of Brahmanism by the later redactors of the collection, who excised whatever was anti-Brahmanistic in spirit. The outline of the collection is a simple one. Amarasakti, King of Mahilaropya, a city of the south (perhaps the Maliarpha of Ptolemy, and the modern Mayilapur near Madras), had three idle and stupid sons. On the advice of his Minister Sumati, he requested an aged Brahman, Vishnusarman, to teach these youths and make them princes indeed. The sage promised to achieve this result within six months, and, to inculcate in them moral principles, he wrote the Pancatantra. After the young men had read this work, they became, within the six months' space, all that Amarasakti could desire. The Pancatantra itself is divided, as its name implies, into five books: the *Mitrabhēda*, or *Separation of Friends;* the *Mitraprāptika*, or *Acquisition of Friends;* the *Kākōlūkiya*, or (*Book of*) *the Crows and Owls; Labdhapranāśa*, or *Loss of what has been Gained;* and *Aparīkṣitakāraka*, or *Thoughtless Action.* About these frameworks fables appropriate to the title of each book are built. After the introduction the order is a box arrangement, familiar to readers of the *Arabian Nights.* The situations are often excellent and the moral teaching beyond reproach. The influence of the Pancatantra on literature has been considerable, as from it in large part the Hitopadesa (q.v.) was taken, and its form very probably exercised an influence, at least remotely, on the *Arabian Nights* (q.v.). The text of the work, which seems from the evidence of the oldest translation to have comprised 12 books instead of five as at present, varies considerably in the different recensions.

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PANCHALA, pȧn-chä'lȧ. The name of a country in ancient India. It was one of the two great divisions of the so-called Madhyadesa, or Midland Country. Its territory lay between the Ganges and the Jumna and extended nearly from Bulandshahr to Allahabad, although at one time it extended over the wider district which lies between the Chambal River and the Himalaya. There were two divisions of Panchala, separated by the Ganges: Northern and Southern. The first had its capital at Ahichhattra, or Adikshetra, in Bareilly; while the capital of the second was at Kampil in Farrukhabad. Consult J. F. Fleet, *Indian Antiquities* (London, 1893), and *The Imperial Gazetteer of India*, vol. xix (new ed., Oxford, 1908).

PANCHATANTRA. See PANCATANTRA.

PANCLASTITES, pän-kläs'tīts. See EXPLOSIVES.

PAN'COAST, HENRY SPACKMAN (1858–). An American literary historian, best represented by his *Introduction to English Literature* (1895; 3d ed., 1907) and *Introduction to American Literature* (1898; rev. ed., 1911), books which are adapted with extraordinary skill to their introductory purpose and are critically judicious, wisely selective, and admirably written. They have had a wide usefulness as school and college texts. Born in Germantown, Pa., and educated at the Academy there and by private tutors, their author began life by the practice of law, but abandoned it in 1887 to turn to teaching and writing. Other works of his are: *Representative English Literature* (1892); *A First Book of English Literature* (1910), with P. V. D. Shelley; *The Vista of English Verse* (1911).

PANCOAST, Joseph (1805–82). An American surgeon, born in Burlington, N. J. He graduated from the medical department of the University of Pennsylvania in 1828 and in 1834 was appointed a physician at the Philadelphia Hospital. Four years later he accepted the professorship of surgery in Jefferson Medical College, a chair which in 1841 he exchanged for that of anatomy. The latter he held until 1874, when he resigned in favor of his son, Dr. William Henry Pancoast, and was elected emeritus professor. After leaving his position at the Philadelphia Hospital he was until 1845 one of its visiting surgeons, and later (1854–64) held a similar position at the Pennsylvania Hospital. He originated several important operations, as that for vesicovaginal fistula (1847), the plastic operation for exstrophy of the bladder (1858), and the excision of the fifth nerve in neuralgia (1872). Pancoast published a number of medical and surgical works, among which are: *A Treatise on Operative Surgery* (1844; 3d ed., 1852); *A Treatise on the Structure, Functions, and Diseases of the Human Sympathetic Nerve* (1831), a translation of Lobstein's Latin original; *A System of Anatomy for the Use of Students* (1844), adopted from Caspar Wistar. In addition he contributed frequently to the *American Journal of the Medical Sciences* and to the *American Medical Intelligencer.*

PANCOAST, William H. (1835–97). An American surgeon. He was born in Philadelphia, graduated from Jefferson Medical College in 1856, and after further study in London, Paris, and Vienna returned to his native city, where he soon established a high reputation. During the Civil War he had charge of a hospital in Philadelphia. In 1867 he became connected with Jefferson Medical College and in 1874 succeeded his father, Joseph Pancoast (q.v.), as professor of surgery. One of the founders of the Medico-chirurgical College in Philadelphia (1887), he there held the chairs of anatomy and clinical anatomy. In 1884 he published a report of the anatomy of the band which united the bodies of the Siamese twins (q.v.) and proved that the tissue could not have been safely cut.

PAN'CRAS, or **PANCRA'TIUS.** A Christian martyr, who suffered death at Rome at the early age of 14 years, during the Valerian or the Diocletian persecution. He was highly honored during the Middle Ages and considered to be the avenger of false oaths. The French kings at one time confirmed their treaties by swearing in his name. The church over his grave in the Via Aurelia, though somewhat altered, is said to have been erected in the fourth century. His day is May 12, the date of his martyrdom.

PANCRA'TIUM (Lat., from Gk. *παγκράτιον*, *pankration*, complete contest, from *παγκρατής*, *pankratēs*, all-powerful, from *πᾶς*, *pas*, all + *κράτος*, *kratos*, strength). A form of Greek athletics, combining wrestling and boxing, the invention of which was ascribed to Theseus. The bare hands were used and were curved, but not clenched, in boxing. It formed part of the great national games of Greece and became very popular at Rome, where it appears to have been introduced in Caligula's time. Consult E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910).

PANCREAS, păŋ'krē-ăs (Neo-Lat., from Gk. *πάγκρεας*, *pankreas*, sweetbread, from *πᾶς*, *pas*, all + *κρέας*, *kreas*, flesh). A compound racemose gland, found lying transversely across the posterior wall of the abdomen behind the stomach, varying in length from 6 to 8 inches, having a breadth of about an inch and a half, and a thickness of from half an inch to an inch. Its usual weight is about three ounces. The large expanded end of the pancreas directed to the right is known as the head, the smaller pointed extremity extending to the left is known as the tail. The head of the pancreas lies in the concavity of the duodenum. This gland is found in all mammals, birds, reptiles, amphibians, and osseous fishes and in some cartilaginous fishes.

The external secretion of this gland, or the pancreatic fluid, is conveyed from its various parts by means of the pancreatic ducts to the duodenum.

For the character and function of the pancreatic fluid, see Digestion, Organs and Process of. There is also an internal secretion, connected with carbohydrate metabolism. See Secretions, Internal.

The pancreas is subject to acute inflammation, which may be hemorrhagic or purulent; both quickly fatal. Chronic interstitial pancreatitis, syphilis, and tuberculosis of the gland are sometimes seen. It may be the seat of tumors and cysts. Calculi rarely form in the pancreatic ducts, blocking them and setting up severe digestive disturbances, often accompanied by glycosuria. The relation of the pancreatic disorders to glycosuria is discussed under Diabetes. See Alimentary System.

PAN'CREATIN. A mixture of the ferments naturally existing in the pancreas of warm-blooded animals and usually obtained from the fresh pancreas of the hog or the ox. The animal should be killed about six hours after a full meal, the organ being then at the height of its activity. The extract is a yellowish, yellowish-white, or grayish amorphous powder, having a faint, peculiar odor and a meaty taste. It contains or should contain the four pancreatic enzymes or ferments: trypsin, which has the property of digesting proteids (meat, eggs, etc.); amylopsin, a diastatic ferment, converting starches into sugars; steapsin, a fat-splitting and emulsifying ferment; and a milk-curdling enzyme. It is used as an artificial agent to digest the food of invalids and old people or those prostrated by fever or exhaustion. It should be capable of converting 25 times its own weight of starch into water-soluble substances.

PANCSOVA, pŏn'chô-vŏ. A royal free city in the County of Torontál, Hungary, situated on the Temes, 3 miles from its confluence with the Danube and 10 miles northeast of Belgrade (Map: Austria-Hungary, G 4). It is a well-built town with a number of public squares, a Greek Oriental church, fine public buildings, a Gymnasium, and a customhouse. The silkworm is cultivated. Its manufactures include silk, liquors, brick, and flour. Trade in grain and swine is important. Pop., 1900, 19,044; 1910, 20,808, chiefly Serbs, Magyars, and Germans.

PANCSOVA, Ludwig Graff de. See Graff de Pancsova, Ludwig.

PAN′DA (perhaps an abbreviation of Naipali *niyalyaponga*, bamboo eater), or Wah. A curious Himalayan mammal (*Ælurus fulgens*), of the raccoon family, and much like a raccoon in habits. It is about the size of a house cat and has a very short muzzle, small rounded ears, a moderately long tail covered with long hair, plantigrade feet with semiretractile claws, and a singular dentition. It dwells chiefly among the rocks of the higher mountain slopes, but also climbs trees, and preys much on birds, small quadrupeds, and insects. It has a thick, fine, woolly covering, adapting it to a cold climate, concealed by long, soft, glistening, and richly colored hair, mostly chestnut brown, which passes into black on the sides and legs and into white on the head. The panda is also called wah and chit-wa, from a peculiar cry which it utters. It is restricted to the southeastern Himalaya, where these animals are occasionally captured and tamed into gentle but inactive pets. An extinct panda lived in Europe during the Pliocene period. Consult Richard Lydekker, *Royal Natural History*, vol. ii (London, 1896).

PANDAN, pȧn-dăn′. A seaport town of Panay, Philippines, situated on the west coast of the island, in the northern part of the Province of Antique (Map: Philippine Islands, D 5). Pop., 1903, 12,162.

PAN′DANA′CEÆ, the Pandanus, or Screw Pine, Family (Neo-Lat. nom. pl., from *Pandanus*, from Malay *pandang*, conspicuous). A family of monocotyledonous plants, belonging to the Oriental tropics, chiefly the coasts and islands of the Indian and Pacific oceans. They are trees or shrubs, sometimes decumbent or climbing and often sending down adventitious roots which bear curious membranous rootcaps. The family comprises the genera *Pandanus* and *Freycinetia*, which have long, simple, imbricated leaves, usually spiny on the back and margin, their base embracing the stem, their spiral arrangement often notably visible. The flowers are mostly monosporangiate, naked, or with only a few scales, arranged on a spadix and wholly covering it.

PANDA′NUS. See Screw Pine; Pandanaceæ.

PAN′DARUS (Lat., from Gk. Πάνδαρος, *Pandaros*). 1. The son of Lycaon and a hero of the Trojan War. With the bow received from Apollo, he became famous as an archer. He broke the truce between the Greeks and the Trojans (*Iliad*, iv, 88), and was killed by Diomedes (*Iliad*, v, 290). 2. One of the companions of Æneas, killed by Turnus. 3. In Shakespeare's *Troilus and Cressida*, and in Chaucer, a go-between or procurer; the uncle of Cressida.

PANDAVAS, păn′dȧ-vȧz. In Hindu legend, the five putative sons of Pandu, the son of the sage Vyasa (q.v.). As he was prevented by a curse laid on him by a sage, whom he had unwittingly killed, from having offspring, his two wives, Kunti and Madri, by a charm obtained from the sage Durvasas, were permitted to bear children by any divinities they chose to invoke. Kunti accordingly bore three of the Pandavas, Yudhishthira, Bhima, and Arjuna, by Dharma, Vayu, and Indra respectively, while Madri gave birth to the other two, Nakula and Sahadeva, by the twin Asvins. Arjuna is by far the noblest of the brothers and is the real hero of the epic of the Mahabharata. It is he to whom Krishna recites the Bhagavad-Gita (q.v.) on the eve of the battle of Kurukshetra. Next to him in uprightness stands Yudhishthira, while Bhima, although gifted with many good qualities, is boastful and irascible, conspicuous for physical rather than moral courage. The two sons of Madri play but a subordinate part. The strife between the Pandavas and their cousins the Kauravas, the hundred sons of Dhritarashtra, the blind brother of Pandu, is the theme of the great Sanskrit epic of the Mahabharata (q.v.). The legend seems to be a reflex of an early tribal war in northern India. Consult: E. W. Hopkins, *The Great Epic of India* (New York, 1902); R. W. Frazer, *Literary History of India* (ib., 1907); A. A. Macdonell, *History of Sanskrit Literature* (2d ed., London, 1913).

PAN′DECTS (Lat. *pandecta*, from Gk. πανδέκτης, *pandektēs*, all-receiving, from πᾶς, *pas*, all + δέχεσθαι, *dechesthai*, to receive). The leading compilation of the Roman law, made by the direction of the Emperor Justinian. It is also sometimes known as the Digest. The celebrated Justinian Code had previously been compiled by his order, but that dealt with the more practical affairs of common occurrence, and the Pandects were designed to supplement it with all the legal learning of the age.

In 530 A.D. Justinian, by the ordinance *De Conceptione Digestorum*, commanded the eminent jurist Tribonianus to select some of the most learned jurisconsults of the Empire to assist him in making a collection of decisions and opinions on all points of law. Tribonianus, who had previously had valuable experience in the preparation of the Codex, formed a commission consisting of himself and 16 others for the purpose. The work was finished and promulgated in the year 533.

The Pandects are divided into 50 books, each containing several titles, and each title several extracts from the authorities, due credit being given to the lawyer or authority from which each extract is derived. The usual form of citation is by the numbers of the book, title, and section or extract. The authorities which were compressed, interpreted, and put in systematic form were said to have consisted of upward of 2000 treatises, and the Pandects contain upward of 9000 separate extracts or statements, selected according to subjects from these treatises and authorities.

The principal jurists from whose writings the extracts were taken were 39 in number and are sometimes called the classical jurists, although some eminent writers confine that name to five of their number, viz., Papinianus, Paulus, Ulpian, Gaius, and Modestinus. The extracts from these authorities indeed constitute the bulk of the collection, those from Ulpian alone making about one-third of the whole work, those from Paulus one-sixth, and those from Papinianus one-twelfth.

The work is deservedly one of the most famous collections of law the world has known. In its relations to the history and literature of Rome it is invaluable; and with its necessary complement, the Codex, it was the basis of all mediæval legislation and of the civil law of today, besides exercising a considerable indirect influence on the law of England. The origin of many doctrines and terms in modern English and American law may be traced to the Pandects, and the idea of codification which prompted the work is being developed in all jurisdictions in general acts on various subjects of the law. See Civil Law; Code; Institutes; Justinian.

PANDEM'IC. See Endemic; Epidemic.

PAN'DER, Christian Heinrich (1794–1865). A Russian naturalist, one of the founders of embryology. He was born in Riga, studied in Würzburg and Jena, and in 1820 accompanied, as naturalist, a Russian expedition to Bokhara. In 1823 he became a member of the Academy of Science at St. Petersburg, but resigned in 1828. He lived in St. Petersburg. His great contribution to the knowledge of embryology was in the study of the development of the chick—in 1817 he made careful research on the embryonic layers which, although known to Wolff half a century before, are commonly called by Pander's name, as is the kernel or central swelling on the germinal disk of the fowl's egg. Later he took up geology and paleontology. Besides *Beiträge zur Entwickelungsgeschichte des Hühnchens im Ei* (1817), and a Latin dissertation on the changes in the egg in the first five days of incubation (1817), Pander wrote *Vergleichende Osteologie* (1821–31), with D'Alton, and *Beiträge zur Geognosie des russischen Reichs* (1830).

PANDO, pän'dô, Manuel de. See Miraflores, Marquis of.

PANDO'RA (Lat., from Gk. *Πανδώρα*, giver of all, also interpreted as gift of all; or gifted by all, i.e., the gods, from *πᾶς*, *pas*, all + *δῶρον*, *dōron*, gift). According to Hesiod, *Theogony*, 570–612, *Works and Days*, 54–105, the first woman. To punish Prometheus and mankind for the theft of fire, at the command of Zeus, Hephæstus formed from earth a beautiful woman, to whom all the gods contributed gifts. She was sent by the gods to Epimetheus, the brother of Prometheus, who in spite of warnings received her to his ruin. One version adds that Pandora opened a cask in which were kept safe many blessings, which thus became scattered and lost, only Hope being saved by the closing of the lid. There are many indications that point to Pandora as an earth goddess like Demeter and render it probable that the original myth is of a new earth given to men as punishment for the theft of fire, from which sustenance can be won only by hard toil. The "Birth of Pandora" was represented on the base of the great statue of Athene Parthenos by Phidias and is found on two Attic vases and two reliefs.

PANDO'RUS SPHINX. A large olive-brown North American hawk moth (*Philampelus pandorus*). See Colored Plate of Moths.

PAN'DROSOS (Gk. *Πάνδροσος*, all-bedewing). The daughter of the Athenian Cecrops. She was the first priestess of Athena and with the latter was honored in the Pandroseum on the Athenian Acropolis.

PANDURO, Lorenzo Hervas y. See Hervas y Panduro, Lorenzo.

PANDYA, pän'dyȧ. A country in the extreme south of ancient India, corresponding roughly to the modern Tinnevelli. Its western boundary was the famous Malaya Mountain (the southern part of the Western Ghats), and its southern the Tambraparni River. The sacred island of Rameswaram, from which Rama (see Ramayana) began his bridge to Ceylon, was also a part of Pandya. The capital was almost certainly Madhura (now Madura), although Kalidasa (q.v.) calls the chief town "Serpent City," which might seem to point to Negapatam, situated on the coast, a little south of Karikal. The Kingdom of Pandya was well known to Ptolemy, Strabo, and Pliny, who call it Pandion, and according to some classical accounts the King sent an embassy to the Emperor Augustus. Consult *The Imperial Gazetteer of India*, vol. xix (new ed., Oxford, 1908).

PAN'EGYR'IST, Roman. A title for certain Roman writers who in the days of the Roman Empire eulogized the reigning Emperor, especially the writers represented in a collection edited by E. Baehrens, *Panegyrici Veteres Latini* (Leipzig, 1874). Among the authors represented are Claudius Mamertinus, Eumenius, Nazarius, and Drepanius Pacatus. Besides the speeches represented in this collection we know of panegyrics by Pliny the Younger (on Trajan), Ausonius, Symmachus, and Ennodius, and of eulogies in verse by Claudian and others. Consult W. S. Teuffel, *Geschichte der römischen Literatur*, vol. iii (6th ed., Leipzig, 1913).

PAN'EL (OF. *panel*, *pannel*, *paneau*, Fr. *panneau*, from ML. *panellus*, panel, dim. of Lat. *pannus*, cloth, rag, Gk. *πῆνος*, *pēnos*, Doric *πᾶνος*, *panos*, thread on the bobbin). Primarily, a flat piece of wood engaged by its edges into the grooves of a frame surrounding it; hence, by extension, any flat surface surrounded by a frame. The frame may be plain or molded, and the flat and relatively thin board may be set with its face flush with one face of the frame (*flush* panel); or it may have the central part of its surface project more than the portions next the frame (*raised* panel); or be itself decorated with moldings or carvings (*molded* panel, *carved* panel). The vertical pieces of the inclosing frame are called *stiles;* the horizontal, *rails*. The deep panels of vaults, like those of the Pantheon and many Renaissance ceilings, are called *caissons* or coffers; small round panels are called *medallions*. In Gothic architecture paneling was often adorned with carved tracery, and in the late or florid period large wall surfaces were covered with paneling itself reproducing tracery forms, as in Henry VII's chapel at Westminster. Wherever woodwork is used for large surfaces it is commonly paneled, as in doors, wainscoting, and furniture.

PANEL. A schedule or list of the names of persons whom a sheriff, or other proper officer of the court, has summoned to serve as jurors.

The term is also applied to the body of persons in attendance upon a court in response to a summons to appear and serve as jurors.

In the Scots law the term "panel" is employed as being synonymous with the English phrase "prisoner at the bar." See Jury; Talesmen; Venire Facias.

PANGANI, pȧn-gä'nē. A coast town of German East Africa, at the mouth of the river Pangani, about 50 miles northwest of Zanzibar (Map: Congo, G 4). It is the seat of a government district, with a customhouse, post office, and telegraph agency. There are a mosque and some stone houses, but most of the houses are of clay. It has the building of the German East Africa Company and is one of the chief export points of the colony, with an extensive inland caravan trade. Pop. (est.), 6000, mostly negroes and Arabs.

PANGASINAN, pän'gȧ-sē-nän'. A province of west Luzon, Philippine Islands, situated at the head of the Gulf of Lingayen (Map: Philippine Islands, C 3). Area 1316 square miles. It is bordered by mountains on the east and west, but practically the whole province is occupied by the lower valley and the delta of the

Agno River. A large part of the coast region is subject to inundations, and even the rice, the staple crop, is sometimes injured by the floods. Other agricultural products are sugar cane, corn, tobacco, and coconuts, and there are abundant deposits of salt and other minerals. The chief industry is the weaving of buri, which is made into mats, hats, and sugar sacks. There are large salt deposits and a good trade in boat building. Active commerce is in the hands of the Chinese. Pop., 1903, 397,902, chiefly Pangasinan (325,705) and Ilocano (58,473). The capital is Lingayen (q.v.).

PANGASINAN. The Christianized Malay people who inhabit the province of the same name in northern Luzon. Like their Ilocano neighbors on the north and the Tagalog on the south, they had made considerable advance in pre-Spanish times. They are classed as a tribe only because they make up a rather strongly marked dialect group. See Philippine Islands.

PAN'GE LIN'GUA (Lat., Proclaim, O tongue). 1. One of the most remarkable of the hymns of the Roman breviary, and like its kindred hymn, *Lauda Sion*, a most characteristic example both of the mediæval Latin rhymed versification and of that union of theology with asceticism which a large class of these hymns present. The Pange Lingua is a hymn in honor of the Eucharist and belongs to the service of the festival of Corpus Christi. It was written by St. Thomas Aquinas (q.v.) in 1263 and consists of six strophes of verses in alternate rhyme. Besides its place in the office of the breviary, the last two stanzas form part of the service of benediction of the blessed Sacrament. 2. A hymn, in unrhymed verse, ascribed to St. Venantius Fortunatus of the sixth century. In the Roman breviary it is assigned to Passion Sunday and to various offices in the week following, being sung entire in the Adoration of the Cross on Good Friday. Consult J. M. Neale, *Mediæval Hymns and Sequences* (3d ed., London, 1867), and Pimont, *Hymnes du bréviaire romain*, iii (Paris, 1884).

PANGEN'ESIS (Neo-Lat., from Gk. *πᾶς*, *pas*, all + *γένεσις*, *genesis*, production, from *γίγνεσθαι*, *gignesthai*, to be born). The name given to a theory proposed by Darwin to account for the facts of heredity. He conceived that the hereditary characters of all organisms were handed down by means of exceedingly minute gemmules thrown off from the individual cells of the body. These invisible granules or gemmules, too minute to be detected by the microscope, were supposed by Darwin to be the bearers of heredity (q.v.). These gemmules were supposed to multiply by self-division and to find their way by various routes to the developing reproductive cells, in which they would accumulate until each reproductive cell contained gemmules representing every part of the body: each gemmule was supposed to develop into the part corresponding to that from which it was derived. This theory was disproved by Galton by experimenting on the transfusion of blood from rabbits of one breed to those of another and finding that the results proved that "the doctrine of pangenesis, pure and simple, is incorrect."

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PAN-GERMANISM. See War in Europe.

PANGO'LIN. The East Indian scaly anteaters of the family Manidæ. See Manis.

PANGO-PANGO. See Pagopago.

PANHANDLE. A name given to the portion of West Virginia which protrudes between Ohio and Pennsylvania and to similar projections of Texas and Idaho.

PAN'HELLE'NIA. A festival of Zeus Panhellenios instituted by the Emperor Hadrian, who also bore the surname Panhellenios.

PANIC, Financial. A panic differs from a crisis in being limited to the acute stage of a financial disturbance rather than covering the entire sequence of events accompanying a period of business depression. Where a crisis is accompanied by panic, the panic extends over only a small part of the period of the crisis; and there have been crises, especially in recent years, which have not been accompanied by acute panic. The means have not yet been found for entirely preventing crises, because they are the result of the combined influence of the separate action of individual merchants and speculators who overestimate the demand for their products and the adequacy of their financial resources. It has, on the other hand, been found possible greatly to mitigate the force of panics, because their character and extent depend to a considerable degree upon the strength of the banking mechanism and the wisdom with which it is administered by financial leaders.

As commerce is in its essence the barter of goods and services for other goods and services, this exchange is carried on largely by paper instruments of credit, which are substantially certificates of barter so long as the process of distributing goods through such instruments is not impeded. When, however, overproduction of goods, beyond effective demand at existing prices, checks the usual process of converting such goods promptly into negotiable instruments available for acquiring other goods, the inability to discharge monetary obligations at their maturity causes a tremor of disturbance to pass through the entire financial system. This disturbance is apt to degenerate into panic if arbitrary limitations are imposed by banking laws or by the policies of the banks upon the extension of credit to sound houses. The rule was laid down by MacLeod that the proper method of stopping a panic is the expansive method and not the restrictive method—in other words, as defined by Bagehot, "to diffuse the impression that, though money may be dear, still money is to be had."

This principle was not well understood during the first half of the nineteenth century, but came into general acceptance after that time. Serious panics occurred in England in 1847 and 1857, largely because this principle was not followed and because the note issue of the Bank of England was subject to such narrow limitations, under the Bank Act of 1844, as practically to nullify the ability of the bank to come to the aid of the money market. Ultimately, when the situation had become acute, the bank was authorized by the government on both occasions to disregard the limit imposed by law upon its note issues and to issue any amount of notes that it thought proper, if secured by good commercial paper. The result of this policy was in both cases to stay the panic almost instantly. The knowledge that money might be had checked the demand for it. Similar action to avert panic was taken by the Bank of England in 1866, but the crisis of 1890 caused by the suspension of the Barings was met in a different way. The restrictions imposed by the Act of 1844 had so stimulated the employment of other instruments of credit that the issue of bank notes was much less important than the willingness of the banks to grant credits in the form of deposit accounts. Panic was practically averted by the energetic action of Mr. William Lidderdale, governor of the Bank of England, in forming a combination among the leading banks of England and Scotland to guarantee the Bank of England against loss, if it promptly assumed the liability of Baring Brothers & Company and met demands for sound credit.

The most serious panic of modern times was threatened on the outbreak of the War of the Nations in August, 1914. For a moment it looked as though the machinery of the credit structure, built up to such enormous magnitude by the commercial and financial development of the previous generation, would be brought to a complete halt, with the result of an appalling crash in credit throughout the world. In every commercial country at war and in many others an extension of time was granted for the payment of commercial obligations, under the form of a moratorium (q.v.) or other similar device. Heavy selling of securities, especially those of American companies, began on the Vienna Stock Exchange soon after the assassination of the Austrian Archduke Francis Ferdinand, on June 28. The selling of such securities became so urgent after the delivery of the Austrian ultimatum to Servia, on July 23, that the Vienna Exchange closed its doors on Monday the twenty-seventh, and the other principal continental exchanges followed this example within a few days. The governors of the New York Stock Exchange decided not to open on the morning of July 31, on the arrival of news that the London Exchange had closed earlier in the same day. Quotations of many securities had declined on the New York Exchange by 10 points within a week, and there were grave fears that, if business were continued, selling orders would so far overshadow buying orders that prices would fall to a point which would seriously impair the value of collateral for bank loans and perhaps reduce important banks as well as individuals to insolvency. The rate of discount was promptly raised at practically every European bank during the closing days of July and the first two days of August. The Bank of England on July 30 advanced its rate to 6 per cent, the next day to 8 per cent, and on August 1 to 10 per cent. The latter rate was fixed, however, only at the suggestion of the government and was not long maintained.

Fortunately the credit mechanism had been so far strengthened by the creation of central banks of issue in every important country of Europe, and the powers of this institution were so promptly extended by the respective governments, that confidence was soon restored. The most serious situation in some respects arose in London, where English banks were creditors of banking and mercantile institutions all over the world. The amount of bills outstanding at one time, payable at London banks, has been estimated as high as £350,000,000, of which many millions fall due daily. The rupture of communications with Germany and Austria-Hungary, and their temporary interruption with Russia and other countries, combined with the inability in most of these countries to take up promptly their obligations in London, put London bankers in the position of creditors for millions which could not be promptly collected. The effect upon the movement of gold, however, was distinctly favorable to London. As her bankers had practically no net indebtedness abroad, they were under no compulsion to export gold and were entitled to receive gold from those countries which were able to liquidate their indebtedness. Hence the gold reserve of the Bank of England, which stood on Aug. 7, 1914, at the comparatively normal figure of £27,622,000, rose steadily until it stood on November 26 at £72,222,000 ($352,100,000). This reserve was subsequently reduced somewhat, as the result of purchases of war supplies in the United States and credits opened in favor of the government of France, but remained for many months far above the normal figures in time of peace.

It was the prompt exercise by the banks of issue of their unlimited power of rediscount which saved the situation and prevented unrestrained panic and almost indescribable financial disaster. The Bank of England received a guarantee from the British government of protection against loss in rediscounting bills drawn prior to the moratorium of August 7. Such rediscounts were to be granted without recourse to the holder of the bill and at the official rate of discount. Another proclamation a little later authorized the Bank of England, with government approval, to advance the necessary funds to meet acceptances until one year after the close of the war. In this way drawers and indorsers of bills were freed from their contingent liabilities, and the joint-stock banks, which carried large amounts of acceptances which they had discounted, were able to bring their bills to the Bank of England for rediscount, not merely relieved of liability as indorsers, but able to carry the amount of the rediscounts to their deposit accounts and thereby to strengthen their resources in call money.

As the result of these measures, the item of "other securities," in the balance sheet of the Bank of England (representing chiefly bills discounted), increased by about £18,000,000 from July 31 to August 7 and stood at £65,351,656. By August 26 this item had risen to £109,904,670. After this date the increase was comparatively slow, the amount of paper thus held on October 1 being £116,819,000, after which there was a downward tendency, checked only in December by the movement of funds necessary to pay a large installment of the government loan of £350,000,000.

Almost inevitably the item of "other deposits," which represents private and banking deposits as distinguished from those of the government, followed a similar course with the increase in discounts. This item, which on July 22, before the war cloud attained serious proportions, stood at £42,285,297, increased on August 7 to £56,749,610, on August 26 to £123,892,659, and on October 8 to £146,646,000. This was very near the highest point reached until the movements connected with the war loan, when such deposits stood on December 3 at £167,970,000, only to fall back the next week to £120,904,000. Thus, by the exercise of its power of rediscount and its control over the central reserves of the country, the Bank of England was able to extend additional accommodation during the crisis to the banking community of England to an amount not less than $500,000,000.

In Germany the government authorized the creation of loan offices, which issued a special form of note upon the deposit of securities and other valuables. Although these notes were at first made available for circulation, they were not largely used for this purpose and were ultimately received by the Imperial Bank as security for loans made in part by the issue of its own notes. The bank discounted freely for the joint-stock banks as well as for its own clients, with the same result as in England, of multiplying many times its ordinary resources in bills discounted and other securities held. The comparatively normal note circulation of July 23, 1914, was 1,890,895,000 marks ($450,000,000). The notes outstanding leaped upward on July 31 to 2,909,000,000 marks, and on August 7 to 3,897,000,000 marks ($925,600,000). Thus within two weeks the Reichsbank, by more than doubling its note circulation, accomplished substantially the same result as was accomplished at the Bank of England by the increase of deposits.

The significant items in the returns of the German bank were the same as at the Bank of England—the increase in discounts and advances. The aggregate of these items stood on July 23, 1914, at the normal figure of 801,000,000 marks ($190,500,000), of which discounts alone made up 751,000,000 marks. The week of July 31 saw the latter item advance to 2,081,000,000 marks; August 7, 3,737,000,000 marks; August 15, 4,426,000,000 marks; and August 31, 4,750,000,000 marks ($1,129,000,000). The latter amount was near the maximum. The following weeks witnessed a rapid decline, which carried the amount down on October 7 to 3,300,000,000 marks and on November 7 to 2,643,000,000 marks.

At the Bank of France it appeared, from a statement of the condition of the bank on Dec. 15, 1914, that advances had been made to the government amounting to about $720,000,000, and that a convention had been signed on September 21 authorizing the increase of this amount to $1,200,000,000. In spite of this obligation the bank extended the same accommodation to the joint-stock banks by way of rediscounts as was extended by the Bank of England and the Imperial Bank of Germany. The discounts, which stood on July 23, on the eve of the war, at about $297,500,000, stood on December 10 at about $770,000,000.

In the United States the apprehension of panic was indicated, in addition to the closing of the Stock Exchange, by the decision of the New York Clearing House committee, on Sunday, August 2, to issue clearing-house loan certificates for use between the banks in settling balances; and by the appearance of the Secretary of the Treasury in New York with the assurance that ample stocks of emergency bank notes prepared under the Aldrich-Vreeland Act of May 30, 1908, were available for issue to the banks. It was the facilities created by this law which afforded the means of meeting the emergency by putting it in the power of the banks to supply the demand for currency and to husband their gold resources. Within the first six days of August the national banks of New York City alone took new notes to the amount of $38,780,000, and, up to August 27, $103,309,260, in addition to a nearly equal amount taken by national banks in other places. The original law was amended to permit the issue of these notes under more favorable terms, and the maximum outstanding, on Oct. 23, 1914, reached $368,616,990. The necessity for these issues was superseded by the organization under the Federal Reserve Law of the 12 regional banks, which opened for business on Nov. 16, 1914, and ultimately the emergency currency issued under the Aldrich-Vreeland Law was entirely withdrawn.

PANICALE, pä′nē-kä′lā, MASOLINO DA. See MASOLINO DA PANICALE.

PAN′ICLE (from Lat. *panicula*, dim. of *panus*, from Doric Gk. *πᾱνος*, *panos*, thread on the bobbin). A compound, spraylike flower cluster produced by the branching of a raceme or corymb, as in many grasses. See INFLORESCENCE.

PAN′ICUM. A genus of grasses. See MILLET.

PANIN, pȧ-nēn′, NIKITA IVANOVITCH, COUNT (1718–83). A Russian statesman, born at Danzig. He entered the army in 1740, was Russian Minister to Denmark in 1747–49, and held a like position in Sweden in 1749–60. He then became the governor of the young Grand Duke Paul, and when Catharine ascended the throne, in 1762, was appointed Minister of Foreign Affairs. Panin originated the Northern Accord, a league of Russia, Prussia, Poland, and Sweden to oppose France and Austria, and he spent much fruitless effort to make this scheme effective. He had great influence over the young Grand Duke, but in 1781 was dismissed from office by Catharine. In 1767 Panin was created Count.

PANINI, pä′nē-nē (fourth century B.C.). The greatest of all the grammarians of India. Of his life very little is known. Combined evidence fixes his birthplace at Salatura, near the modern town of Attock, in the extreme north of the Punjab. According to a verse in the Pancatantra (q.v.) he was killed by a lion. A late and trivial legend, told by Somadeva in the *Kathāsaritsāgara*, describes the future grammarian in his youth as a very stupid pupil of a Brahman named Varsha. Being sent away, Panini practiced such austerities in the Himalaya that Siva, pleased with the penance, revealed to him the grammar which he then set forth to the world. The work of Panini is the oldest Sanskrit grammar which has been preserved. Although he names no less than 64 predecessors in two schools, a northern and a southern, their books have been so entirely superseded by his that they have disappeared. He marks the line between Vedic and classical Sanskrit. (See SANSKRIT LANGUAGE.) His influence is shown by the fact that the language as he fixed it never changed its character so far as the literary usage was concerned. The grammar of Panini, called *Ashṭādyhyāyi*, consists of eight books, or lectures (*adhyāya*), each of which contains four chapters, or *pādas*. The chapters are composed of varying numbers of extremely short rules, or *sūtras*, of which the entire work contains 3996. Of these three, or perhaps four, were not written by Panini himself. The rules are in algebraic style and are so compact and obscure that they are unintelligible without close study. He invented a large number of arbitrary symbols to express various grammatical terms, which increase the obscurity of his work, even while they contribute in a large measure to its brevity. There is, however, a certain amount of method beneath these apparently arbitrary symbols. His system of grammar is based on the theory of the verbal origin of nouns. The arrangement is widely different from that found in Occidental works. Thus, instead of treating phonology, inflection, conjugation, and the like separately, Panini traces a given phonetic change, as the change of *n* to *ṇ*, throughout the language, without reference to the class of words in which it may occur. Syntax is not considered by him, and the inflection, strictly speaking, must be built up from the rules scattered throughout the work. The authority gained by Panini was well deserved, for his grammar is one of the most exhaustive ever written. This preëminence, together with his extreme obscurity, has called forth a number of commentaries. Of these the most important were the *Mahābhāṣya*, or Great Commentary, of Patanjali (q.v.), probably in the second century B.C., edited by Kielhorn (3 vols., Bombay, 1878–85; 2d ed., 1892–1906), in which previous commentaries were summarized, and the first complete one, the *Kāśikā Vṛtti*, or Benares Commentary, of Jayaditya and Vamana, about 650 A.D., edited by Bala Sastri (Benares, 1898). To the grammar there are added as appendixes a *Dhātupātha*, or Index of Roots, and the *Gaṇapātha*, or Index of Classes or Word-groups, both ascribed to Panini. The first contains 1961 roots, of which only about 800 have thus far been found in Sanskrit, although comparative linguistics establishes the existence of a number besides. About 50 roots known to occur in the Vedas are omitted. The second appendix is a collection of lists of words following the same rule as the first one of their series which is given in the main grammar. The chief edition, with a German translation, is that by Böhtlingk, *Pâninis Grammatik* (2 vols., Leipzig, 1887), though the English translation of Chandra Vasu (7 vols., Allahabad, 1891–97) deserves to be mentioned. Consult: Goldstücker, *Pāṇini, his Place in Sanskrit Literature* (London, 1861); A. F. Weber, "Zur Frage über das Zeitalter Pāninis," in *Indische Studien*, vol. i (Berlin, 1861); Kielhorn, *Der grammatiker Pānini* (Göttingen, 1885); Liebich, *Pānini* (Leipzig, 1891); B. Geiger, *Māhabhāṣya, übersetzt, erläutert und mit einem Anhang* (Vienna, 1908).

PANIPAT, or **PANIPUT**, păn'ê-pŭt'. A town in the District of Karnal, Punjab, British India, situated near the old bank of the Jumna, 53 miles north of Delhi by rail (Map: India, C 3). It figured in the negotiations between Yudishthira and Duryodhana about 1100 B.C. As an outpost of Delhi on the military road between Afghanistan and the Punjab it was the scene of several battles prominent in the history of upper India. The most important are the battle of 1526, when the Afghan forces of Ibrahim Lodi, Emperor of Delhi, were routed by an inferior force of Moguls under Baber, who occupied Delhi and became Emperor; that of 1556, when Akbar, the grandson of Baber, won a victory over the Afghans under the Hindu general Himu; and that of 1761, when the united armies of the Mahratta chieftains were defeated by the Afghans under Ahmad Shah Durani. Army manœuvres are conducted in the neighborhood. There are cotton goods, metal ware, and glass manufactures, also cotton gins and compresses. Pop., 1901, 26,914; 1911, 26,342.

PANIQUITAN, pä'nê-kē'tan. An Indian language of Colombia, South America. Consult: H. Pittier de Fábrega, in American Anthropological Association, *Memoirs* (Lancaster, Pa., 1907), and Beuchat and Rivet, *Affinités des langues du sud de la Colombie, etc.* (Louvain, 1910). Beuchat and Rivet consider Paniquita to belong to the Chibchan stock.

PANITAN, pá-nē'tän. A town of Panay, Philippines, in the Province of Capiz, situated on the Malinannang River, 7 miles south of Capiz. Pop., 1903, 7578.

PANIZZI, pá-nē'tsē, SIR ANTONIO (1797–1879). Principal librarian of the British Museum from 1856 to 1866. He was born Sept. 16, 1797, at Brescello in the Duchy of Modena. He studied at the University of Parma, graduating in the faculty of law in 1818. He practiced in his birthplace. In 1828, despite favors from the Duke of Modena, he became involved in the conspiracy to overthrow the Modenese government and was arrested, but he escaped to England. Under the patronage of William Roscoe the historian he taught Italian at Liverpool. In 1828 Lord Brougham got him the Italian professorship at University College, London, and in 1831 the post of assistant librarian in the British Museum. In 1837 Panizzi was made keeper of the printed books, and in 1856 he succeeded Sir Henry Ellis (q.v.) as principal librarian. He resigned in 1866. He was made K.C.B. in 1869. His death occurred at his London home near the Museum, April 8, 1879.

Panizzi was a man of immense energy and capacity. A friend of the leading statesmen of the time in England, France, and Italy, he continued to wield political influence down to his death. Panizzi really made over the British Museum. Under his direction the library was removed from Montague House to its present quarters. He designed the famous reading room and its annexes, perhaps his most brilliant conception. He framed the catalogue rules. He obtained for the library the princely bequest of Thomas Grenville, consisting of more than 20,000 rare volumes, valued at £54,000. In 1843 he drew up an elaborate report of the deficiencies in the library, which led two years later to an annual grant from the government of £10,000 for the purchase of books. This fund, still continued, has helped to make the library the richest in the world. Panizzi wrote many articles for the magazines and also edited Boiardo's *Orlando innamorato*, Ariosto's *Orlando furioso* (1830–34), and Lord Vernon's reprint of the first four editions of *The Divine Comedy* (1858). Consult Louis Fagan, *Life of Panizzi* (London, 1880).

PANJAB, pŭn-jäb'. A province of British India. See PUNJAB.

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